

TATA ENERGY RESEARCH INSTITUTE

REPORT ON PHOTO VOLTAIC SOLAR SYSTEMS

**MARKETING & BUSINESS ASSOCIATES
FEBRUARY, 1996**

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INTRODUCTION

Background

- 1.1 The Tata Energy Research Institute (TERI) proposed to assess the commercial viability of Photo Voltaic Solar Systems (PVSS) in selected states of India. TERI had commissioned Marketing & Business Associates Private Limited (MBA) to carry out a study on PVS Systems. This document presents the findings of the study conducted in September 1995.

Objectives

- 1.2 The primary objective of the study was to examine the feasibility of commercially marketing PV Solar Systems for selected applications in urban and rural markets.

This involved :

- A. Studying the demand for products in the selected states.
- B. Determining the factors that inhibit/drive the market.

Methodology

- 1.3 The study was undertaken in the states of Uttar Pradesh, Rajasthan, Andhra Pradesh and Karnataka. In these states, urban and rural markets were covered, comprising households, commercial establishments, farmers and rural community centres. Interviewing was done using structured questionnaires. The concept was introduced with the help of concept cards comprising of photographs and a write up on each product.

Product Tested

- 1.4 The products to be pretested were specified by TERI

Urban Locations : Domestic Lighting, Solar Modules

Rural Locations : Domestic Lighting, Solar Modules
Water Pumping Systems and Solar Lanterns.

Sample Size

- 1.5 The sample size proposed and achieved by segments is as specified below :

	Proposed	Achieved
Households (Urban)	800	886
Commercial Establishments (Urban)	400	463
Farmers (Rural)	450	493
Rural Community Centres	40	42

Respondent Profile

- 1.6 The profile of the respondents met in each segment is as specified below :

Households : Main earners above the age of 26, of households with
Monthly Household Income above Rs. 4000/- p.m.

Commercial Establishments : Owner/managers of shops, small offices,
restaurants etc.

Farmers Farmers met were those owning more than 5 acres of land and a tractor.

Rural Community Centre Managers/Incharge of RCC which were centres where any form of group activity took place in the village.

1 7 This report presents the findings in the following format :

Chapter 2 : Findings : Urban Households

Chapter 3 : Findings : Urban Commercial Establishments

Chapter 4 : Findings : Rural Farmers

Chapter 5 : Findings : Rural Community Centres.

Chapter 6 : Consolidated Findings : Statewise (North India)

Chapter 7 : Consolidated Findings : Statewise (South India)

Chapter 8 : Summary & Conclusions

Appendices

Questionnaire

Note : All percentage tables in the report may not add upto 100 either due to rounding of or multiple responses.

CHAPTER 2

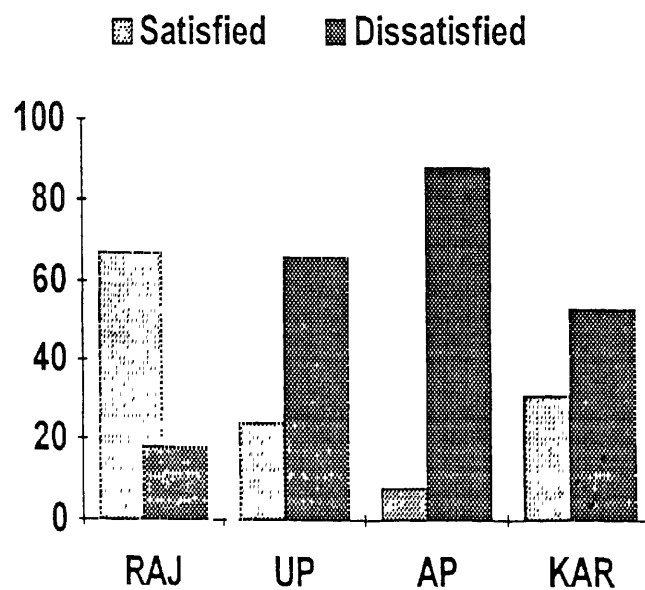
FINDINGS : URBAN HOUSEHOLDS

- 2.1 This chapter presents the findings for urban households across the four states of Rajasthan, UP, Karnataka and Andhra Pradesh. The total number of household met was 886 against the proposed sample size of 800. The respondents were probed on various issues related to the electricity supply situation in their towns and their reactions to PVSS. The responses to the various queries have been consolidated in this chapter.

Power Supply Situation

- 2.2 The respondents were asked to indicate their overall satisfaction with the quality of electric supply. The responses are as summarised in the figure below :

Figure 2.1 : Satisfaction with Power Supply



- 2.3 More than half the sample across in three of the four states were dissatisfied or very dissatisfied with the power supply situation. The situation was particularly grave in Andhra Pradesh where dissatisfaction levels were as high as 88%. The situation in Rajasthan seems to be much better with only 18% being dissatisfied.
- 2.4 The respondents were probed on the adequacy of power supply, duration and frequency of power failure and quality of supply voltages. The findings are as summarised below.
- 2.5 On being probed whether there was adequate power supply, more than 50% of the total sample across the states (except Rajasthan) disagreed. The responses are summarised in the table below :

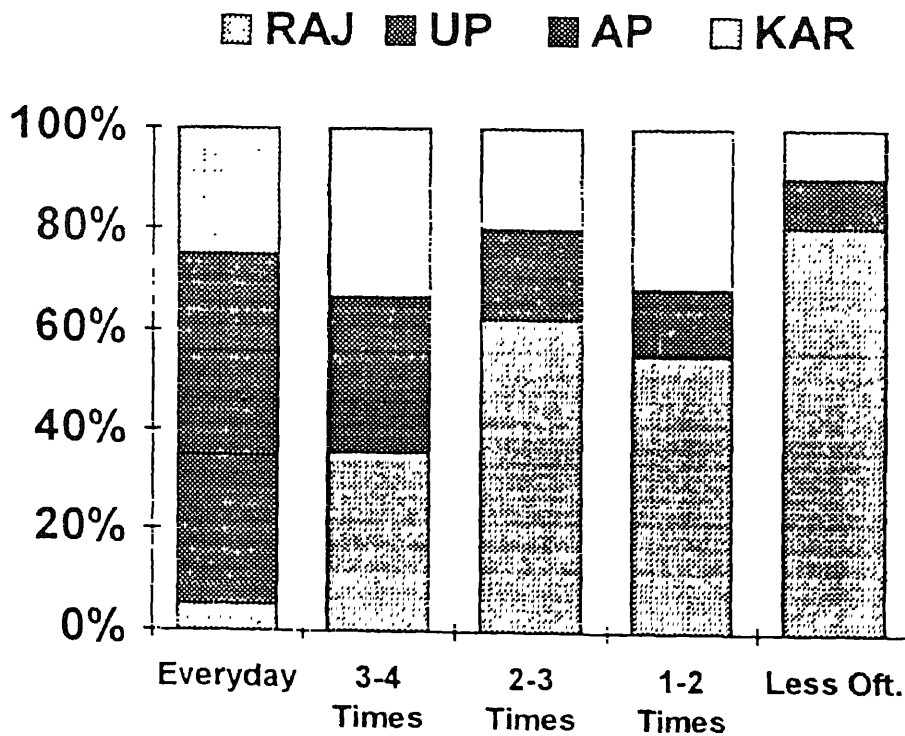
Table 2.1 : Adequate Power Supply

	(All Figs in %)			
	RAJ N = 222	UP 210	AP 208	KAR 253

Strongly Disagree	1	22	21	8
Disagree	14	42	65	41
Neither Disagree Nor Agree	7	4	7	14
Agree	75	32	6	37
Strongly Agree	3	*	1	*

- 2.6 As seen earlier the situation was particularly grave in AP with almost all respondents feeling that power supply was not adequate. 64% of the respondents in UP and 49% of the respondents in Karnataka felt that power supply was inadequate. The situation in Rajasthan was better as only 15% felt that there was inadequate power supply and more than 75% agreed with the statement that there was adequate power supply.
- 2.7 The respondents were probed on the frequency of power interruptions / load shedding. The responses are summarised in the figure below :

Figure 2.2 : Frequency of Power Failure



- 2.8 Most households across the states covered faced power interruptions everyday. The crisis was most severe in Andhra Pradesh where all the respondents faced power interruption daily. The situation seemed somewhat better in Rajasthan where only 13% faced power interruptions everyday.

- 2.9 The duration of the power interruptions ranged from 1-5 hours across the states. The duration was somewhat higher in Andhra compared to the other states. On being probed about the supply voltage most felt that the voltage was normal. Around 20% felt that there were wide fluctuations. The problem of fluctuations in supply voltage seemed more severe in the Northern states as compared to Andhra and Karnataka.

Alternative Lighting/Back Up Source Used

- 2.10 Respondents were asked what alternative sources of lighting / power they used during power interruptions. The responses are summarised in the table below :

Table 2.2 : Alternative Lighting Source

	(All figs in %)			
	RAJ N = 222	UP 210	AP 208	KAR 253
Candles	91	90	65	88
Kerosene Lamps	29	24	42	34
Emergency Lights	18	31	44	30
Invertor	--	3	1	4
Generator	1	16	1	1
Others *	13	16	9	10

(* Gas Lamp, LPG Petromax, Oil Lamp)

Note : (Muliple responses exist)

- 2.11 Most of the households met used candles / kerosene lamps during power failures. Emergency lights (battery powered) were also being used by a fair number of households. There was negligible use of generators/invertors except in UP where around 16% of the respondents met were using invertors or generators.
- 2.12 On being probed about the average monthly expenditure on alternative lighting/power most of the households (75%) spent less than Rs. 50/- per month to provide them lighting during power failure.

Minimum Power Requirement

- 2.13 Respondents were probed on what they felt would be their minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are summarised in Table 2.3.

Table 2.3 : Minimum Power Requirement
All Figures in %

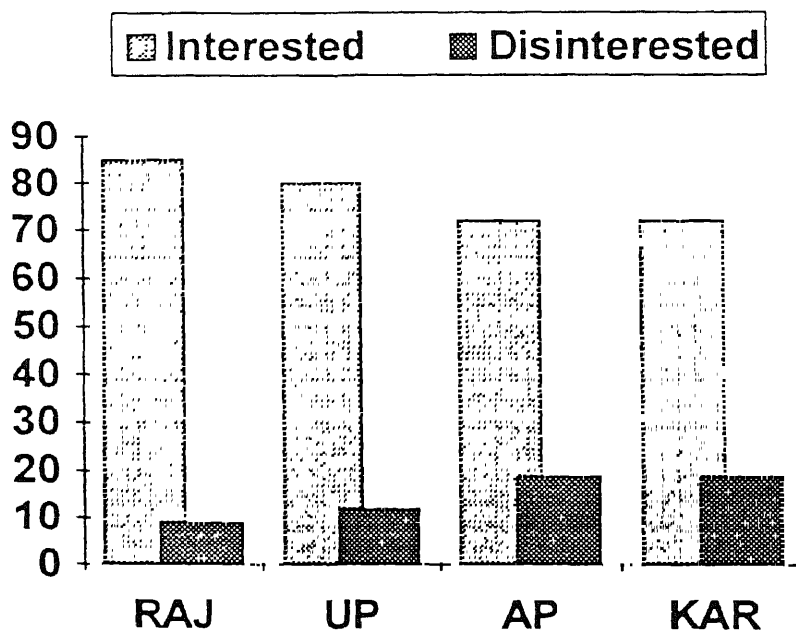
	RAJ N = 222	UP 210	AP 208	KAR 253
No. of Lights				
One	26	14	7	12
Two	40	51	48	44
Three	16	19	10	18
Four	10	11	19	12
More than Four	9	6	16	11
No. of Fans				
One	37	42	32	52
Two	43	41	47	23
Three	10	9	6	5
More than Three	7	7	8	5
TV	27	43	71	46
Cooking Devices	--	--	2	6
Refrigerator	4	3	--	1

Overall the requirement indicated is 1-2 lamps and 1-2 fans in most households. Television was mentioned in Andhra as a basic requirement.

Reactions to the PVSS Concept

- 2.14 The respondents were introduced to the product concept and reactions sought subsequently. The respondents were probed on their interest in the PVSS especially as an alternative source of power. Please note that these reactions are without any cost being associated with the product and are summarised in the figure below :

Figure 2.3 : Interest in the Concept



- 2.15 Three fourths of the respondents met were interested in the product. The response was especially encouraging in Rajasthan and UP where more than 80% of the respondents said they were interested. The number of respondents was more than 70% in the Southern states of Andhra Pradesh and Karnataka. Overall the response to the concept was very positive.

Willingness to Invest

- 2.16 The respondents were probed on their willingness to invest in the product if it generated sufficient power to enable them to have the minimum required lighting/cooling etc. The investment households are prepared to make is summarised in the table below.

Table 2.4 : Willingness to Invest

Rs.	All Figures in %			
	RAJ N = 222	UP 210	AP 208	KAR 253

< 5000	51	53	30	43
5000 - 10000	23	31	46	26
10000 - 15000	9	5	17	10
15000 - 20000	4	5	4	5
20000 - 30000	9	3	1	2
> 30000	*	1	1	1

* Negligible

- 2.17 Overall, three fourths the households met were willing to invest upto Rs. 10,000/- only. In Rajasthan and UP more than 50% of the respondents met were willing to invest upto Rs. 5000/- only.

Reactions to Price and Purchase Intent

- 2.18 The respondents were exposed to various configurations of solar modules for lighting and cooling and corresponding investment required. They were probed on their willingness to invest in the product given the configuration and price.

Configuration 1 : 2 Lamps, 1 Fan, 1 CTV

Cost : Rs. 28,000/-

The responses to Configuration 1 are summarised in the table below :

Table 2.5 : Purchase Intent (Configuration 1)

	All Figs in %			
	RAJ N = 222	UP 210	AP 208	KAR 253
Definitely won't buy	64	67	30	49
May not buy	13	23	35	20
May or May not buy	7	3	19	20
May buy	13	6	14	10
Definitely buy	3	--	2	1

- 2.19 The intent to buy was not very encouraging as most felt that they would not buy the product at the indicated price. Roughly 12% of the respondents met across the states said they would buy the product.

Configuration 2 : 2 Lamps and 1 Fan

Cost . Rs. 18,000/-

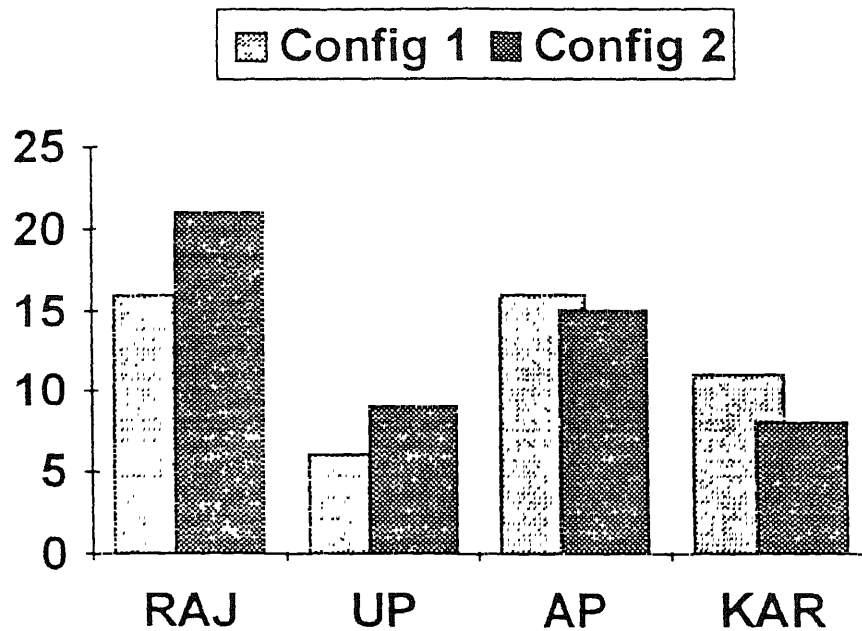
The responses to configuration 2 are summarised in the table below.

Table 2.6 : Purchase Intent (Configuration 2)

	All Figs in %			
	RAJ N = 222	UP 210	AP 208	KAR 253
Definitely won't buy	57	64	31	51
May not buy	14	18	36	20
May or May not buy	6	9	19	20
May buy	15	7	14	7
Definitely buy	6	2	1	1

- 2.20 The response to the more basic configuration 2 was marginally better than the response to the first, but still was not very encouraging. More than 50% still said that they would not buy the product. However the proportion of respondents who said they may buy or would definitely buy was somewhat higher as compared to the response to configuration 1 (13 % in the second case).

Figure 2.4 : Positive Purchase Intent



Market Potential

- 2.21 To estimate the potential MBA considered the total number of urban households having monthly household incomes in excess of Rs.4000 in the states surveyed and applied the survey results to this (the proportion of respondents who showed a positive inclination towards the product). Based on MBA's calculations the estimated demand in each state is summarised in table 2.7.

Table 2.7 : Estimated Demand

	RAJ	UP	AP	KAR
Urban Population (in Lacs)	100	276	178	139
@ No. Of households (in Lacs)	22	61	40	31
\$ Target Population (in Lacs)	03	09	06	04
& Proportion of people willing to buy Config. 1 (%)	9.9	3.1	9.1	5.9
Estimated demand for Config.1 (in Thousands)	30	28	55	24
& Proportion of people willing to buy Config. 2 (%)	13.5	5.5	7.9	4.9
Estimated demand for Config.2 (in Thousands)	41	50	47	20

@ Assuming an average family size of 4.5 members / hh

\$ Assuming 14% of the households are above Rs.4000/-p.m

& Considered respondents saying 'May buy' and 'Will definitely buy' in Table 2.8 and 2.9 and assumed probabilities of 0.5 for 'May buy' and 1.0 for 'Will definitely buy'

Demographic & Respondent Profile

- 2 22 The profile of respondents met are summarised in the table below. The variables considered were age, education, occupation, income, ownership of electrical devices and average size of the households

Figure 2.5 : Age of the Respondents

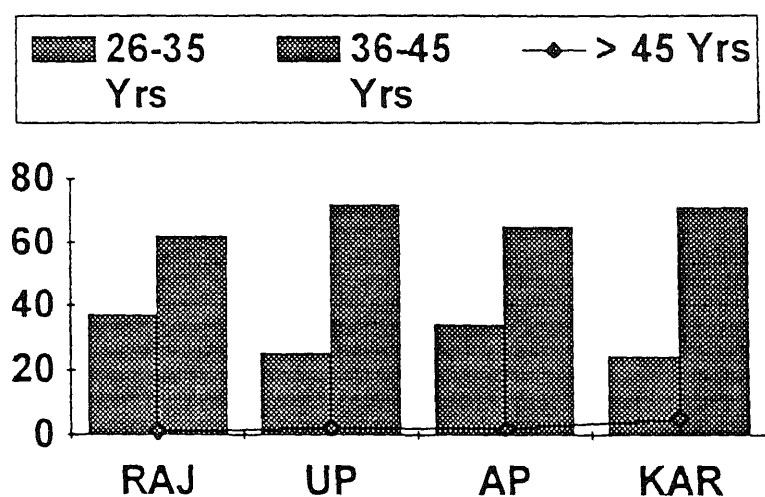


Table 2.8 : Educational Background of Respondents
All Figs in %

Education	RAJ N = 222	UP 210	AP 208	KAR 253
Illiterate	2	----	-----	----
School upto 4 years	1	----	-----	-----
School upto 9 years	5	1	1	-----
School upto HSC/SSC	18	8	1	2
Some college (include. Diploma)	5	1	9	15
Graduate/PG-General	43	45	54	62
Graduate/PG-Professional	25	44	35	21

Table 2.9 : Occupation of Respondents
All Figs in %

Occupation	RAJ N = 222	UP 210	AP 208	KAR 253
Shop owner	2	2	4	--
Businessman/Industrialist	37	19	33	7
Self Employed Professional	5	12	7	2
Clerical/Salesman	7	5	4	24
Supervisory level	14	10	10	1
Officers/Executive-Junior	18	17	26	23
Officers/Executives-Middle/Senior	17	35	16	43

Figure 2.6 : Total Monthly Household Income

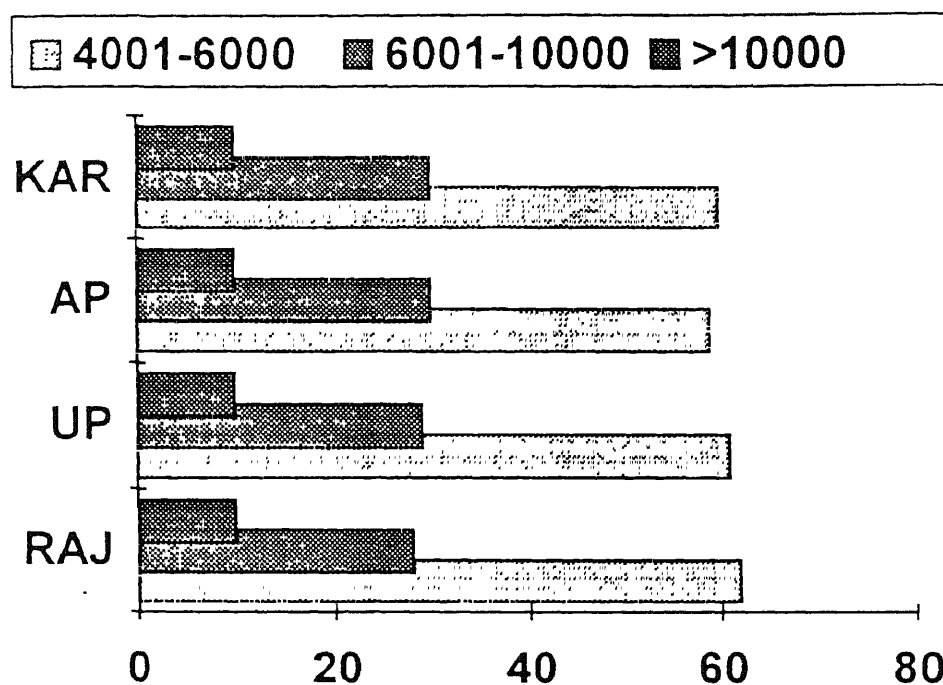


Table 2.10 : Number of members per Household

All Figs in %						
Number of members		N =	RAJ 222	UP 210	AP 208	KAR 253
< 4	members		12	18	9	23
4	members		26	34	34	39
5	members		21	21	24	20
6	members		15	19	17	8
7	members		9	4	5	4
> 7	members		17	5	13	7

- 2.23 The respondents were probed on ownership of various electrical devices. The ownership pattern is summarised in table 2.16 below.

Table 2.11 : Ownership of Electrical Devices

		RAJ N = 222	UP 210	AP 208
--- KAR 253				
Average Nos. of Bulbs/household	8	9	5	7
Average Nos of Tubes/household	5	5	4	4
Average Nos. of Fans/household	4	5	3	3
Other Devices	% Owning			
Refrigerators	81	94	75	59
AC	2	8	6	2
Room Heater	27	44	2	5
Booster Pump	24	36	5	9
TV	95	91	91	93
Cooler	78	87	55	05
Water Purifier	9	13	2	11
Washing Machine	26	33	48	36

2.24 The respondents were probed on the type of cooking medium used by them. The responses are summarised in the table below.

Table 2.12 : Cooking Medium

All Figs in %				
Cooking Medium	RAJ N = 222	UP 210	AP 208	KAR 253
LPG	98	99	100	90
Electric Stove	5	2	--	24
Kerosene	14	--	3	24

CHAPTER 3

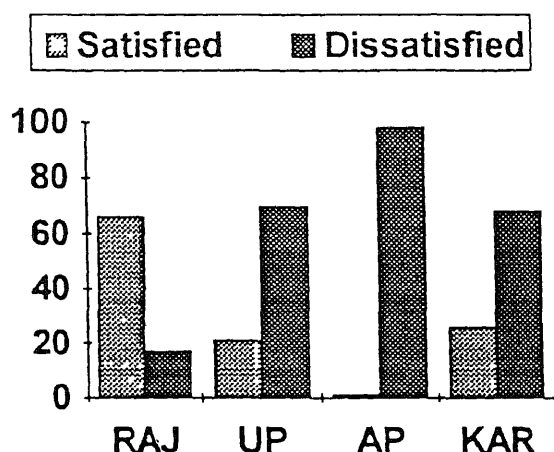
FINDINGS : URBAN COMMERCIAL ESTABLISHMENTS

- 3.1 This chapter presents the findings for the commercial establishments (urban) across the four states of Rajasthan, UP, Karnataka and Andhra Pradesh. The total number of establishments met was 461 against the proposed sample size of 400. The respondents were probed on various issues related to the electricity supply situation in their town. The responses to the various queries are consolidated in this chapter.

Power Supply Situation

- 3.2 The respondents were probed on their overall satisfaction with the quality of electric supply. The responses are as summarised in the figure below :

Figure 3.1 : Satisfaction with Power Supply



- 3.3 More than 60% of the population across the states of UP, AP and Karnataka were dissatisfied / very dissatisfied with power supply situation. The situation was particularly grave in Andhra Pradesh where dissatisfaction levels were as high as 98%. The situation in Rajasthan seemed better with only 17% being dissatisfied.

- 3.4 The respondents were probed on the adequacy of power supply, duration and frequency of power failure and supply voltage. The findings are as summarised below.
- 3.5 On being probed whether there was adequate power supply, more than 50% of the total sample across the states disagreed. The responses are summarised in the table below :

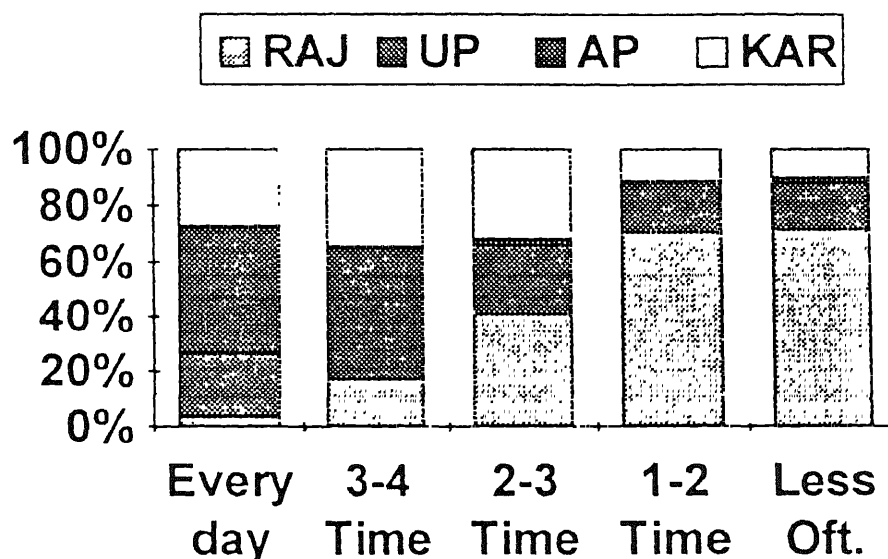
Table 3.1 : Adequate Power Supply

	All Figs in %			
	RAJ N = 117	UP 101	AP 101	KAR 142
Strongly Disagree	2	16	30	16
Disagree	8	31	68	46
Neither Disagree Nor Agree	9	12	1	4
Agree	78	37	1	34
Strongly Agree	3	5	--	--

- 3.6 The situation was particularly grave in AP as 98% of the respondents felt that power supply was not adequate. 47% of the respondents in UP and 62% of the respondents in Karnataka felt that power supply was inadequate. The situation in Rajasthan was better as only 10% felt that there was inadequate power supply and more than 80% agreed with the statement that there was adequate power supply.

- 3.7 The respondents were probed on the frequency of power interruptions / load shedding. The responses are summarised in the figure below :

Figure 3.2 : Frequency of Power Failure



- 3.8 More than 70% of the respondents across the states of UP, AP and Karnataka faced power interruptions everyday. The crisis was most severe in Andhra Pradesh where 100% of the respondents faced power interruptions daily. The situation seemed somewhat better in Rajasthan where only 17% faced power interruptions everyday.
- 3.9 The duration of the power interruptions ranged from 1-5 hrs across the states. On being probed about the supply voltage 70% of the respondents said the voltage was normal. Around 13% felt that there were wide fluctuations.

Alternative Lighting/Back Up Source Used

- 3.10 The respondents were probed on their current practice during power interruptions. Respondents were asked what alternative sources of lighting/power they used during power interruptions. The responses are summarised in the table below :

Table 3.2 : Alternative Power Sources

All Figures in %				
	RAJ N = 117	UP 101	AP 101	KAR 142
Candles	59	41	46	40
Kerosene Lamps	5	4	2	--
Emergency Lights	31	27	27	19
Invertor	1	4	6	9
Generator	18	68	19	33
UPS	3	3	1	2
Others (Gas Lamp, LPG Petromax Battery)	12	1	12	7

- 3.11 Most of the respondents met across the four states used candles, generators or emergency lights during power failure.

- 3.12 On being probed about the average monthly expenditure on alternative lighting/power most of the establishments spent less than Rs. 100/- per month to provide them lighting during power failure. The average expenditure was somewhat higher in UP which probably arose from the fact that 68% of the establishments met used generators

Minimum Power Requirements

- 3.13 The respondents were asked what they felt would be their minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are summarised in the table 3.3.

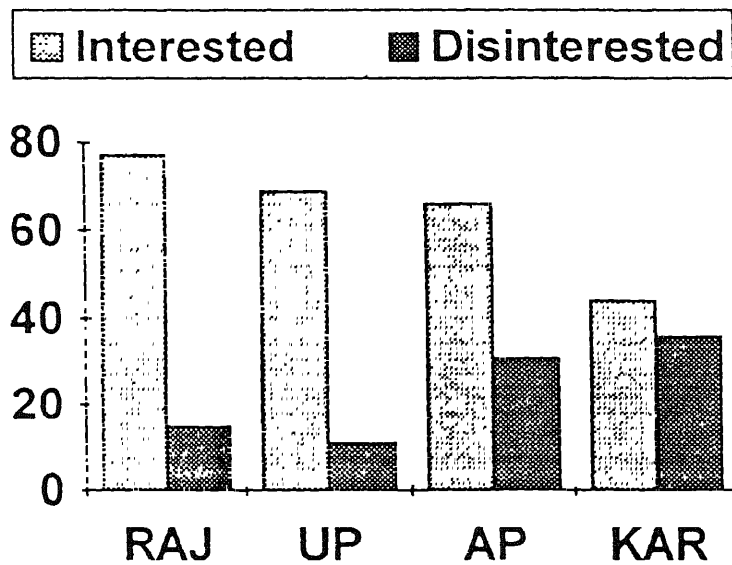
Table 3.3 : Minimum Power Requirements
All Figures in %

	RAJ N = 117	UP 101	AP 101	KAR 142
No. of Lights				
One	16	5	1	16
Two	25	12	32	28
Three	9	3	9	4
Four	9	8	26	9
Five	7	4	2	3
More than Five	22	63	30	35
No. of Fans				
One	36	16	23	28
Two	29	30	49	18
Three	16	16	7	4
More than Three	29	--	17	5
Electronic Typewriter	1	5	--	5
Computer	4	7	13	6
Others (Refrigeration, cooler, printing achines etc.)	19	4	12	14

Reactions to the Concept

- 3.14 The respondents were introduced to the concept and reactions sought subsequently. The respondents were probed on their interest in the PVSS especially as an alternative source of power. The reactions are summarised in the figure below :

Figure 3.3 : Interest in the Concept



- 3.15 Nearly 80% of the total number of respondents met were interested in the concept. The response was especially encouraging in Rajasthan AP and UP. The number of interested respondents was around 40% in Karnataka. Overall the response to the concept was very positive.

Willingness to Invest

- 3.16 The respondents were probed on their willingness to invest in the concept given that it generated sufficient power to enable them to have the minimum required lighting/cooling etc. The responses are summarised in the table below.

Table 3.4 : Willingness to Invest

Rs.	All Figures in %			
	RAJ N = 117	UP 101	AP 101	KAR 142
1 - 5000	28	22	20	35
5000 - 10000	27	30	27	20
10000 - 15000	13	13	10	10
More than 15000	23	30	38	13

- 3.17 Over 60% of the total respondents were willing to invest upto Rs.10,000/- in the product around 30% were willing to invest more than Rs. 15,000/- in Rajasthan, UP and AP. The figure was only 13% in Karnataka.

Reactions to Price and Purchase Intent

- 3.18 The respondents were exposed to various configurations of solar modules for lighting and cooling and corresponding investments. They were probed on their willingness to invest in the product given the configuration and price.

Configuration 1 6 Lamps, 2 Fan, 1 TV

Cost Rs. 54,000/-

The responses to the Configuration 1 are summarised in the table below .

Table 3.5 : Purchase Intent (Configuration 1)

All Figs in %				
	RAJ N = 117	UP 101	AP 101	KAR 142
Definitely won't buy	78	74	24	66
May not buy	11	12	55	18
May or May not buy	6	6	11	13
May buy	4	7	7	2
Definitely buy	1	--	2	1

- 3.19 The intent to purchase was not very encouraging in Rajasthan, UP and Karnataka as majority of the respondents said that they would definitely not buy the product. The response in AP was marginally better though on the negative side. .

Configuration 2 . 6 Lamps and 2 Fans

Cost : Rs. 44,000/-

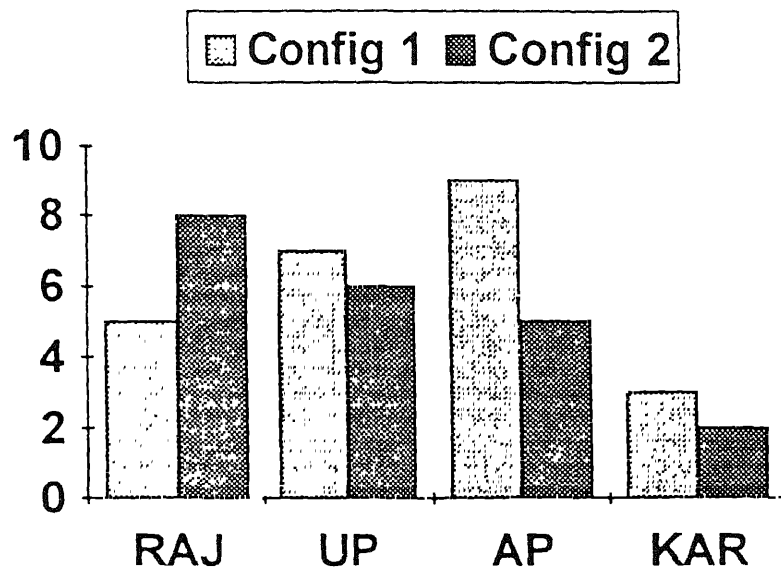
The responses to configuration 2 are summarised in the table below.

Table 3.6 : Purchase Intent (Configuration 2)

	All Figs in %			
	RAJ N = 117	UP 101	AP 101	KAR 142
Definitely won't buy	79	79	22	66
May not buy	10	7	54	18
May or May not buy	3	6	19	15
May buy	7	6	4	2
Definitely buy	1	--	1	--

- 3.20 The intent to buy in case of configuration 2 was not very encouraging either. Most of the respondents still held that they would not invest in the product.

Figure. 3.4 : Positive Purchase Intent



Note : Due to the absense of data on the universe of the commercial establishments MBA was unable to compute the estimated demand for this segment of respondents.

Profile of Establishments

3.21 The profile of the establishments is summarised in the table below :

Table 3.7 : Nature of Business

All Figs in %					
Nature of Business	N =	RAJ 117	UP 101	AP 101	KAR 142
Office		11	20	6	20
Restaurant		9	12	3	6
Shop		74	58	87	68
Saloon		3	--	1	4
Others		3	9	4	2

Table 3.8 : Number of Employees

All Figs in %					
Number of Employees	N =	RAJ 117	UP 101	AP 101	KAR 142
1 - 10		87	72	90	88
11 - 20		8	13	2	6
21 - 30		3	6	1	1
> 30		2	8	1	2

Table 3.9 : Turnover

All Figs in %

Nature of Business	N =	RAJ	UP	AP	KAR
		117	101	101	142
< Rs. 5 lakhs		32	20	46	52
Rs. 6 - 10 lakhs		19	17	26	18
Rs. 11 - 20 lakhs		15	12	16	6
> Rs. 20 lakhs		30	29	8	14

Ownership & Usage of Electrical Devices

- 3.22 The respondents were probed on the ownership and usage of devices. The findings are summarised in the table below :

Table 3.10 : Ownership of Devices

Devices	RAJ N = 222	UP 210	AP 208	KAR 253
Average Nos. of Bulbs/Estb.	10	17	6	10
Average nos. of Tubes/Estb.	12	23	10	12
Average Nos. Of Fans/Estb.	04	06	05	05
Other devices	% Owning			
Refrigerator	24	20	30	13
Room Heater	7	8	--	--
Deep Freezer	12	10	9	2
Xerox Machine	2	1	3	6
Computer	5	21	11	5
Printers	5	18	3	5
Cooler	16	2	4	--
TV	5	--	2	5
Others (Typewriter, Fax, Grider etc.)	12	17	21	37

CHAPTER 4

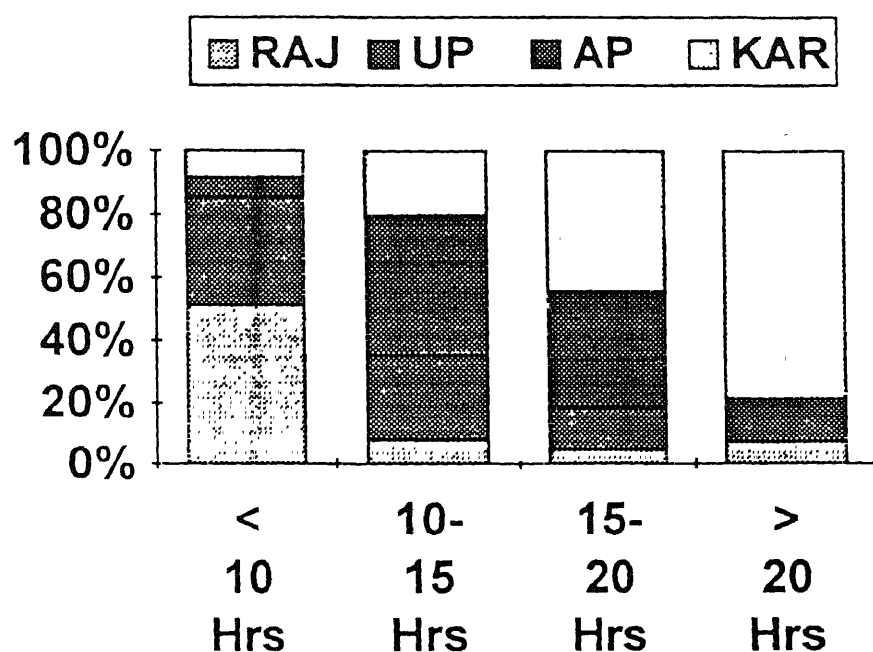
FINDINGS : RURAL FARMERS

- 4.1 This chapter presents the findings for the farmers (rural) across the four states of Rajasthan, UP, Karnataka and Andhra Pradesh. The total number of farmers met was 493 against the proposed sample size of 450. The respondents were probed on various issues related to the electricity supply situation in their villages and their reactions to PVSS. The responses to the various queries are consolidated in this chapter.

Power Supply Situation

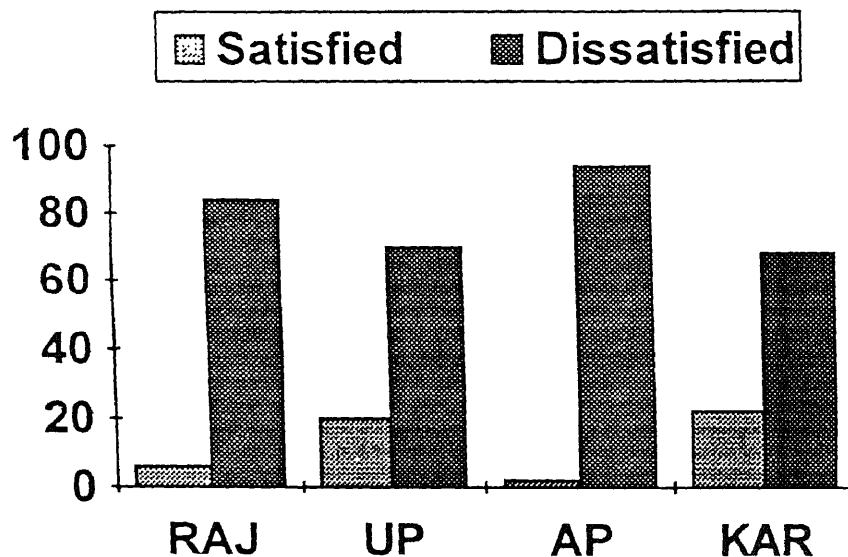
- 4.2 Most of the respondents met were connected to the grid. The respondents were probed on the average number of hours in a day, power supply was available. The responses are summarised in the figure below :

Figure 4.1 : Average Hours of Power Supply



- 4.3 The power supply situation in the North was rather grave. 80% of the respondents met in Rajasthan received less than 10 hrs of power supply in a day, in UP 53% received less than 10 hrs of power supply. Most of the respondents met received less than 20 hours of power supply on an average, across the four states.
- 4.4 The respondents were probed on their overall satisfaction with the quality of electric supply. The responses are as summarised in the figure below :

Figure 4.2 : Satisfaction with Power Supply



- 4.5 More than 70% of the population across the four states were dissatisfied / very dissatisfied with power supply situation. The situation was particularly grave in Andhra Pradesh where dissatisfaction levels were as high as 94%. UP and Karnataka dissatisfaction levels were around 70%. The situation in Rajasthan was poor where 84% of the respondents were dissatisfied.

- 4.6 The respondents were probed on the adequacy of power supply, duration and frequency of power interruptions and supply voltages. The findings are as summarised below.

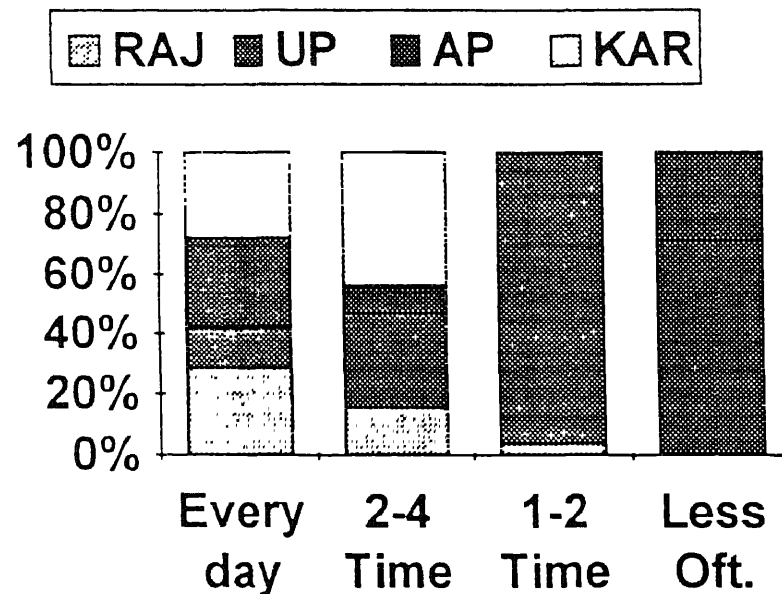
Table 4.1 : Adequate Power Supply

All Figs in %				
	RAJ N = 110	UP 156	AP 101	KAR 126
Strongly Disagree	27	22	32	3
Disagree	59	42	38	55
Neither Disagree Nor Agree	2	4	16	12
Agree	7	32	11	30
Strongly Agree	--	*	3	*

- 4.7 The situation was particularly grave in Rajasthan as 86% of the respondents felt that power supply was not adequate. 64% of the respondents in UP and 58% of the respondents in Karnataka felt that power supply was inadequate. In AP too, dissatisfaction levels were high, as 70% of the respondents felt that power supply was not adequate.

- 4.8 The respondents were probed on the frequency of power interruptions / load shedding. The responses are summarised in the figure below :

Figure 4.3 : Frequency of Power Failure



- 4.9 90% of the respondents across Rajasthan, AP and Karnataka faced power interruptions everyday. The situation seemed somewhat better in UP where only 42% faced power interruptions everyday.
- 4.10 The duration of the power interruptions ranged from 6-10 hrs in UP, AP and Karnataka. The duration was somewhat higher in Rajasthan compared to the other states, and often exceeded 10 hrs a day. When probed on supply voltages the respondents were unable to respond coherently.

Alternative Lighting/Back Up Source Used

- 4.11 Respondents were asked about alternative sources of lighting / power they used during power interruptions. The responses are summarised in the table below :

Table 4.2 : Alternative Power Sources

	All Figures in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Candles	79	97	50	48
Kerosene Lamps	86	90	93	82
Emergency Lights	--	8	10	16
Invertor	--	--	--	--
Generator	--	--	--	3
Others (Gas Lamp, LPG Petromax Oil Lamp)	2	16	5	10

- 4.12 Most of the respondents met across the four states used candles or kerosene lamps during power failure. On being probed about the average monthly expenditure on alternative lighting/power most of the farms spent less than Rs. 100/- per month to provide them lighting during power failure.

Minimum Power Requirements

- 4.13 They respondents were asked what they felt would be the minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are summarised below :

Table 4.3 : Minimum Power Requirements

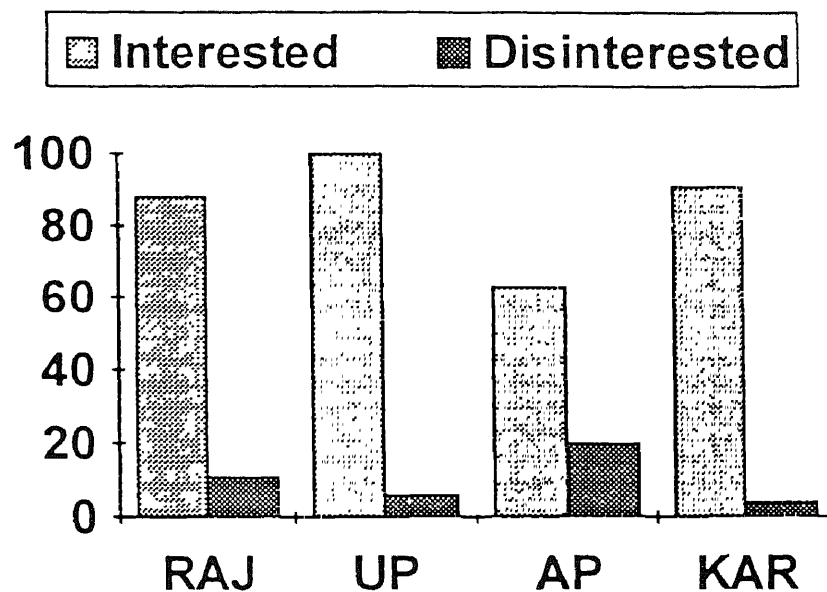
All Figures in %

	RAJ N = 110	UP 156	AP 101	KAR 126
No. of Lights				
One	12	10	10	2
Two	38	35	51	16
Three	26	15	12	14
Four	9	21	10	17
More than Four	15	16	13	44
No. of Fans				
One	37	34	59	29
Two	30	35	19	18
Three	9	6	1	4
More than Three	11	8	6	13
TV	17	36	39	72
Cooking Devices	--	--	--	--
Water pumping	5	18	3	29

Reactions to the Concept

- 4.14 The respondents were introduced to the concept and reactions sought subsequently. The respondents were probed on their interest in the PVSS especially as an alternative source of power. The reactions are summarised in the figure below :

Figure 4.4 : Interest in the Concept



- 4.15 Nearly 90% of the respondents met were interested in the concept in Rajasthan, UP & Karnataka. The interest level was somewhat lower in AP at 63%. Over all however, the response to the concept was positive.

Willingness to Invest

- 4.16 The respondents were probed on their willingness to invest in the concept given that it generated sufficient power to enable them to have the minimum required lighting/cooling etc. The responses are summarised in the table below.

Table 4.4 : Willingness to Invest

Rs.	All Figures in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
> 2500	16	12	18	16
2501 - 5000	32	31	41	10
5001- 7000	8	10	8	6
7001 - 10000	14	20	19	8
10001 - 15000	4	12	6	10
> 15000	4	8	8	33

- 4.17 Around 45% of the respondents in the Northern states of Rajasthan and UP and 60% in AP were willing to invest upto Rs. 5,000/- only in the product. The scenario was somewhat different in Karnataka where 33% were willing to invest more than Rs. 15,000/- in the product.

Reactions to Price and Purchase Intent

- 4.18 The respondents were exposed to various configurations of solar modules for lighting and cooling and corresponding investments. They were probed on their willingness to invest in the product given the configuration and price.

Configuration 1 : Irrigation Pump Set

Cost : Rs. 2,80,000/-

The responses to the Configuration 1 are summarised in the table below :

Table 4.5 : Purchase Intent (Configuration 1)

	All Figs in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Definitely won't buy	80	63	88	76
May not buy	4	2	5	5
May or May not buy	4	4	6	13
May buy	11	5	--	6
Definitely buy	--	--	2	--

- 4.19 The intent to purchase the product was not very encouraging as more than 60% of the respondents said they definitely won't buy the product. The figure was as high as 80-85% in the case of Rajasthan, AP and Karnataka.

Configuration

Configuration 2 : Submersible Pump Set

Cost : Rs. 88,000/-

The responses to configuration 2 are summarised in the table below.

Table 4.6 : Purchase Intent (Configuration 2)

	All Figs in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Definitely won't buy	90	75	83	80
May not buy	2	--	5	10
May or May not buy	3	1	10	7
May buy	5	2	1	2
Definitely buy	1	--	1	1

- 4.20 The intent to buy in case of configuration 2 was not very encouraging either. More than 75% of the respondents said they would definitely not buy the product. Barely 3-5% respondents replied in the positive.

Configuration 3 2 Lights

Cost . Rs 14,000/-

Table 4.7 : Purchase Intent (Configuration 3)

	All Figs in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Definitely won't buy	66	81	35	59
May not buy	6	2	15	13
May or May not buy	15	9	32	8
May buy	11	3	15	18
Definitely buy	1	5	4	2

- .21 The intent to purchase in case of configuration 3 was greater as compared to Configuration 1 & 2. The intent to purchase was relatively higher in the South.

Configuration 4 : Solar Lantern

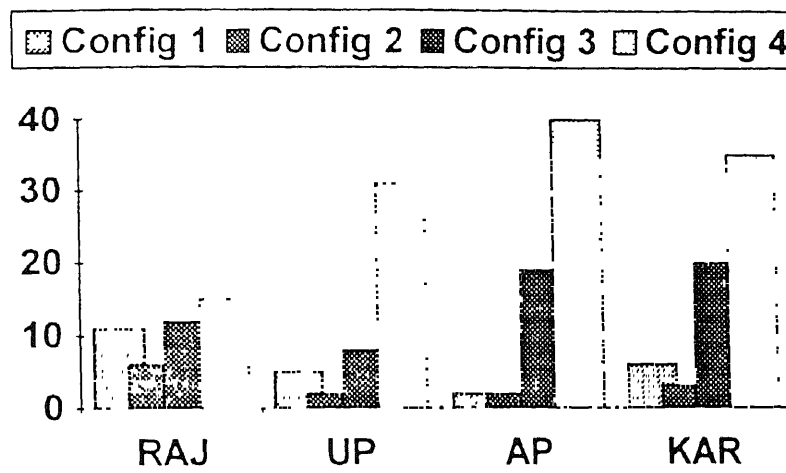
Cost : Rs 5,000/-

Table 4.8 : Purchase Intent (Configuration 4)

	All Figs in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Definitely won't buy	69	63	24	51
May not buy	8	7	8	9
May or May not buy	8	23	29	6
May buy	11	21	31	30
Definitely buy	4	10	9	5

4.2.2 The purchase intent in case of Configuration 4 was somewhat higher

Figure 4.5 : Postive Purchase Intent



Potential

- 4.23 In order to estimate the potential in each of the states considered, MBA used the tractor population as the universe. Based on MBA's calculations the estimated demand of each configuration is summarised in the table below :

Table 4.9 : Estimated Demand

	RAJ	UP	AP	KAR
Rural Population(in lakhs)	339	115	486	310
Tractor Population (in 000')	245.2	440.8	60.9	117.6
#Proportion of population willing to invest in Config 1 (%)	5.4	2.9	2.0	3.2
Estimated Demand:Cofig 1('000)	13.2	12.8	1.2	3.8
#Proportion of population willing to invest in Config 2 (%)	3.2	1.0	1.5	2.0
Estimated Demand:Cofig 2('000)	7.8	4.4	0.91	2.3
#Proportion of population willing to invest in Config 3 (%)	6.4	4.5	11.4	10.7
Estimated Demand:Cofig3('000)	15.6	19.8	6.9	12.6
#Proportion of population willing to invest in Config 4 (%)	9.4	20.5	24.5	20.0
Estimated Demand:Cofig 4('000)	23	90.3	14.9	23.5

Considered respondents saying "May buy" and "Will definitely buy" assuming a probability of 0.5 for May buy and 1.0 for Will definitely buy.

- 4 24 Solar Lanterns had the greatest potential followed by Lamps. The estimated demand for irrigation pumpsets is somewhat higher than submersible pump sets.

Usage & Ownership of Electrical Devices

- 3 25 The farmers were probed on the ownership of devices. The responses are summarised in the table below.

Table 4.10 : Ownership of Devices

Devices	All Figs in %			
	RAJ N = 110	UP 156	AP 101	KAR 126
Electric Lights				
< 5 lights	39	41	42	14
> 5 lights	61	59	58	86
Fans				
1	11	14	28	33
2	15	33	43	20
3	17	15	18	10
4	15	13	05	10
5	06	06	04	03
> 5	17	15	03	08
TV	48	82	90	76

Table 4.10 : Ownership of Devices (Contd...)

All Figs in %				
Devices	RAJ N = 110	UP 156	AP 101	KAR 126
Water Pumps				
1	29	39	37	23
2	16	22	01	25
> 2	12	13	01	10
Motors / Machines	21	06	03	05
Fridge	05	19	04	02
Cooler	13	15	--	--

CHAPTER 5

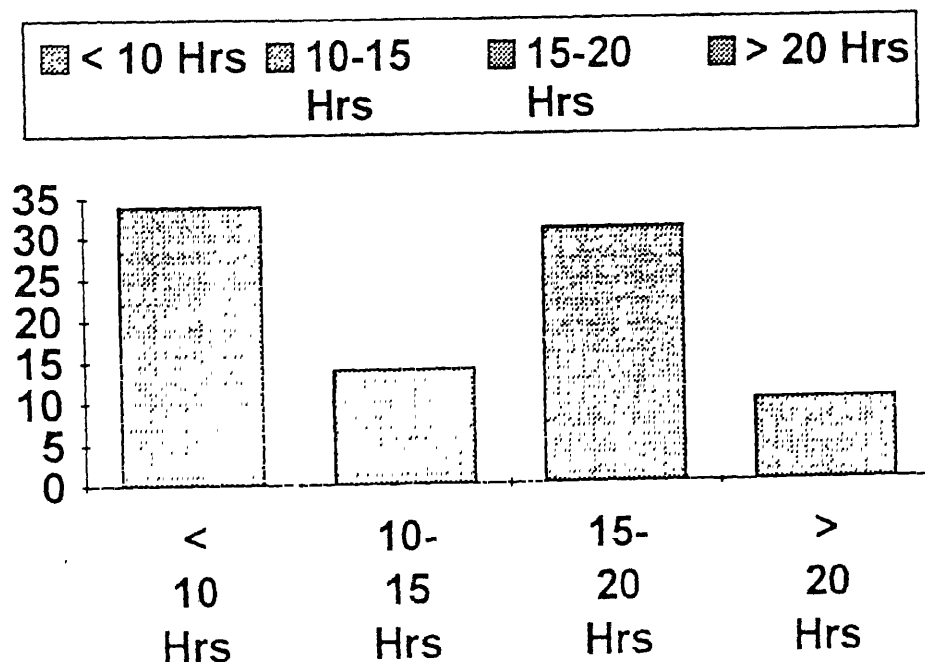
FINDINGS : RURAL COMMUNITY CENTRES

- 5.1 This chapter presents the findings for the rural community centres across the four states of Rajasthan, UP, Karnataka and Andhra Pradesh. The total number of rural community centres met was 42 against the proposed sample size of 40. The managers of the community centres were probed on various issues related to the electricity supply situation in their villages and PVSS. Due to the small sample size the responses to the various queries consolidated in this chapter, are not presented separately for each state but as a total figure.

Power Supply Situation

- 5.2 The respondents were probed on the average number of hours in a day, power supply was available. The responses are summarised in the figure below :

Figure 5.1 : Average Hours of Power Supply



- 5.3 The respondents were probed on their overall satisfaction with the quality of electric supply. The responses are as summarised in the table below.

Table 5.1 : Satisfaction with Power Supply

All Figs in %	
N = 42	
	Total
Very Dissatisfied	19
Dissatisfied	48
Neither Satisfied Nor Dissatisfied	07
Satisfied	12
Very Satisfied	--

- 5.4 More than 50% of the population across the four states were dissatisfied / very dissatisfied with power supply situation. The situation was particularly grave in Rajasthan where dissatisfaction levels were as high as 100%.

- 5.5 The respondents were probed on the adequacy of power supply, duration and frequency of power failure and supply voltages. The findings are as summarised below :

Table 5.2 : Adequate Power Supply

	All Figs in %
	N = 42
	Total
Strongly Disagree	14
Disagree	52
Neither Disagree Nor Agree	05
Agree	14
Strongly Agree	--

- 5.6 The situation was particularly grave in Rajasthan as 100% of the respondents felt that power supply was not adequate. 40% respondents in UP and AP felt that the power supply is not adequate and 83% in Karnataka.

- 5.7 The respondents were probed on the frequency of power interruptions / load shedding. The responses are summarised in the table below .

Table 5.3 : Frequency of Power Failure

All Figs in %	
N = 42	
	Total
Almost Everyday	67
3-4 times a week	05
2-3 times a week	07
1-2 times a week	05
Once a month	02
Less often	--

- 5.8 All the respondents faced power interruptions in Rajasthan everyday. The situation seemed somewhat better in UP. However the situation was grave across states, as 67% of the RCC's faced power interruptions daily.
- 5.9 The duration of the power interruptions more than 5 hrs across the states. The duration was somewhat higher in Rajasthan compared to the other states.

Alternative Lighting/Back Up Source Used

- 5.10 The respondents were probed on their current practice during power failure. Respondents were asked what alternative sources of lighting / power they used during power interruptions. The responses are summarised in the table below :

Table 5.4 : Alternative Power Sources

All Figs in %	
N = 42	
	Total
Candles	31
Kerosene Lamps	48
No provision	31

- 5.11 All the respondents met across the four states still use candles or kerosene lamps during power failure.
- 5.12 On being probed about the average monthly expenditure on alternative lighting/power most of the rural community centres spent less than Rs. 100/- per month to provide them lighting during power failure.

Minimum Power Requirements

- 5.13 The respondents were asked what they felt would be their minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are summarised in the table below .

Table 5.5 : Minimum Power Requirements

All Figs in %	
N = 42	
	Total
No. of Lights	
One	21
Two	33
Three	05
Four	02
More than Four	14
No. of Fans	
One	48
Two	07
Three	02
TV	17
No reply	19

Reactions to the Concept

- 5.14 The respondents were introduced to the concept and reactions sought subsequently. The respondents were probed on their interest in the PVSS especially as an alternative source of power. The reactions are summarised in the table below :

Table 5.6 : Interest in the Concept

All Figs in %	
N = 42	
	Total
Not at all Interested	10
Not Interested	--
Neither Interested Nor Disinterested	12
Interested	67
Very Interested	10

- 5.15 The interest in the concept was high across all the states, and ranged between 70-85%. The interest in the concept was particularly high in Rajasthan and Karnataka.

Willingness to Invest

- 5.16 The respondents were probed on their willingness to invest in the concept if it fulfilled their basic requirements of power. The responses are summarised in the table below.

Table 5.7 : Willingness to Invest

	All Figs in % N = 42
	Total
< 2500	33
2501 - 5000	24
5001- 7500	07
7501 - 10000	10
> 10000	05

- 5.17 In Rajasthan, AP and Karnataka most of the respondents were willing to invest upto a maximum of Rs. 5000/-. In UP however 40% of the respondents were willing to invest between Rs. 7,500-Rs. 10,000/-.

Reactions to Price and Purchase Intent

- 5.18 The respondents were exposed to various configurations of solar modules for lighting and cooling and corresponding investments. They were probed on their willingness to invest given the configuration and price.

Configuration 1 : Submersible Pump Set

Cost : Rs. 88,000/-

The responses to the configuration 1 are summarised in the table below :

Table 5.8 : Purchase Intent (Configuration 1)

All Figs in %	
N = 42	
	Total
Definitely won't buy	83
May not buy	10
May or May not buy	07
May buy	--
Definitely buy	--

- 9 The intent to buy was not very encouraging, as around 90% of the respondents said that it was unlikely they would buy the product given the price and efficiency. None of the rural community centres seemed interested in buying the product.

Configuration 2 : 2 Lamps, 1 TV

Cost : Rs. 32,000/-

The responses to configuration 2 are summarised in the table below

Table 5.9 : Purchase Intent (Configuration 2)

	All Figs in %
	N = 42
	Total
Definitely won't buy	71
May not buy	10
May or May not buy	12
May buy	07
Definitely buy	--

- 0 The intent to buy in case of configuration 2 was somewhat more encouraging compared to configuration 1. The response was especially encouraging in the South and Rajasthan. In UP however none of the centres said they may buy the product.

Configuration 3 : 1 Solar Lantern

Cost Rs. 5,000/-

Table 5.10 : Purchase Intent (Configuration 3)

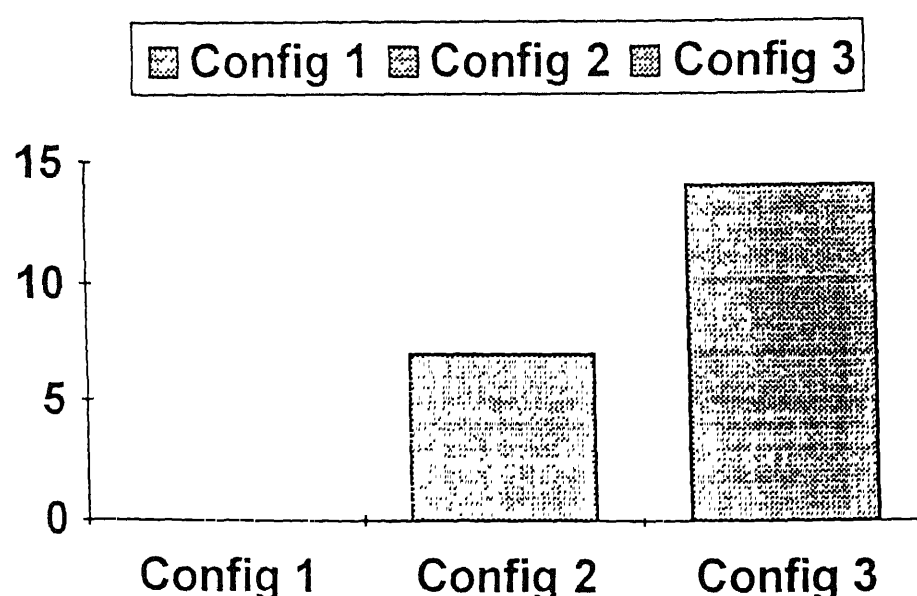
All Figs in %

N = 42

	Total
Definitely won't buy	50
May not buy	07
May or May not buy	29
May buy	14
Definitely buy	--

- 5.21 The response to Configuration 3 was in the same lines as Configuration 2 except in Karnataka where 33% of the respondents said they may buy the product

Figure 5.2 : Positive Purchase Intent



Potential

- 5.22 To estimate the potential, MBA considered an average of 10 RCCs per district. There are in all 133 districts across the four states and approximately 1330 RCCs. Based on the proportion of RCCs who showed a positive inclination towards the products the estimated numbers are 47 for Configuration 2 and 93 for Configuration 3 across the four states. There are no takers for Configuration 1. The potential is maximum for Configuration 3. Overall however the RCCs are not a segment which offers high potential.
- 5.23 The potential among RCC's is highest in Karnataka. Configuration 3 had the maximum potential.

Usage & Ownership of Electrical Devices

- 5.24 The proportion of RCCs having electrical devices are summarised in the table below.

Table 5.11 : Ownership of Devices

All Figs in %	
N = 42	
	Total
Electric Lights	70
Fans	50
TV	24
Water Pump	12
Cooler	05
Radio Mike	02

CHAPTER 6

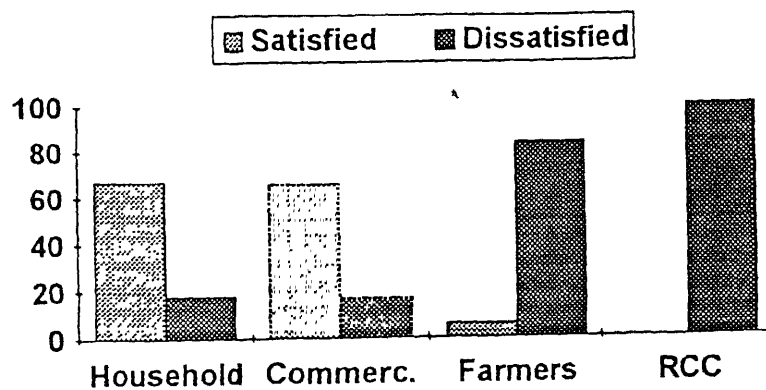
FINDINGS : STATEWISE : NORTH INDIA

This chapter presents key tables, consolidated for the Northern states of Rajasthan and UP covered in the survey.

Rajasthan

- 6.1 A comparison of different segments on their overall satisfaction with the quality of electric supply is summarised in the figure below .

Figure 6.1 : Satisfaction with Power Supply



- 6.2 From the table it is apparent that the electricity supply situation in urban Rajasthan was much better than the situation in rural Rajasthan, where dissatisfaction levels was 90% or more.

- 6.3 The respondents were probed on the adequacy of power supply. The findings for Rajasthan are summarised in table 6.2 below

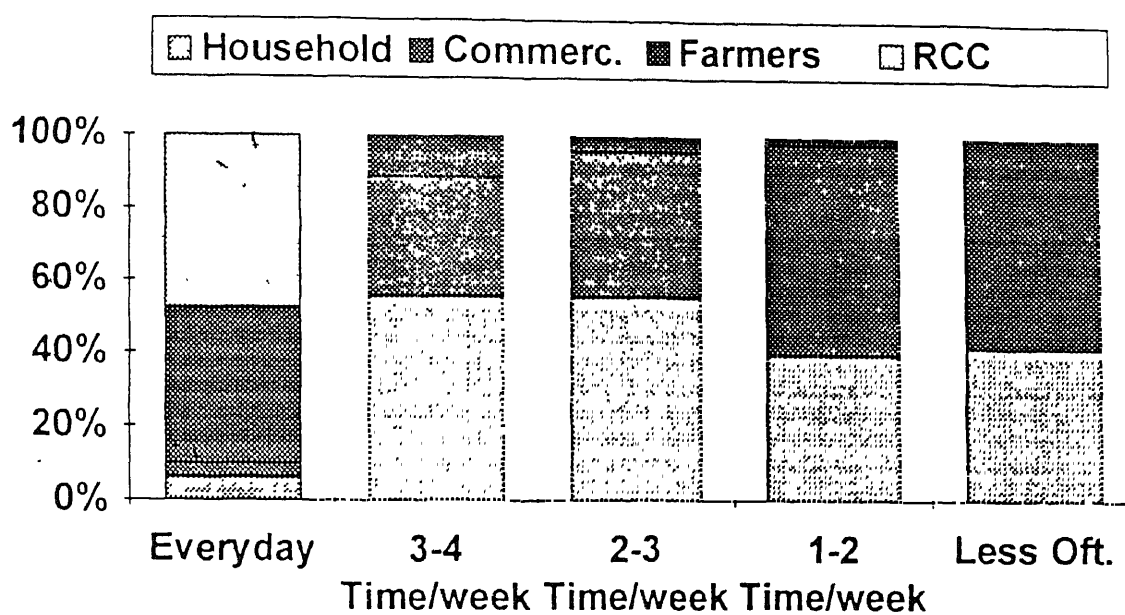
Table 6.1 : Adequate Power Supply

	All Figs in %			
	House- holds N = 222	Comm. Estab. 117	Far- mers 110	Rural Comm. Centres 10
Strongly Disagree	1	2	27	40
Disagree	14	8	59	60
Neither	7	9	2	--
Agree	75	78	7	--
Strongly Agree	3	3	--	--

- 6.4 Most of the respondents from rural Rajasthan disagreed with the statement that there was adequate power supply. The response was better in urban Rajasthan where most of the respondents agreed that there was adequate power supply.

- 6.5 The respondents were probed on the frequency of power interruptions / load shedding. The responses are summarised in the figure below :

Figure 6.2 : Frequency of Power Failure



- 6.6 The frequency of power failure was high in rural Rajasthan where more than 90% of the respondents faced power interruptions everyday. The situation was much better in urban Rajasthan.

- 6.7 Respondents were asked what alternative sources of lighting / power they used during interruptions. This is summarised below .

Table 6.2 : Alternative Power Sources

	All Figs in %			
	House- holds N = 222	Comm. Estab. 117	Far- mers 110	Rural Comm. Centres 10
Candles	91	59	79	80
Kerosene Lamps	29	5	86	--
Emergency Lights	18	31	--	--
Invertor	--	1	--	--
Generator	1	18	--	--
UPS	--	3	--	--
Others (Gas Lamps, LPG Petromax, Oil Lamp)	1312	2	--	--

(Note : Multiple responses exist)

- 6.8 Candles and kerosene lamps were the source of alternative lighting mostly used in rural Rajasthan. In urban Rajasthan candles and kerosene lamps were used but a fair number of the respondents met were using emergency lights (battery powered) as well. Use of generators and UPS among commercial establishments was quite high.

- 6.9 The respondents were asked what they felt would be their minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are as below :

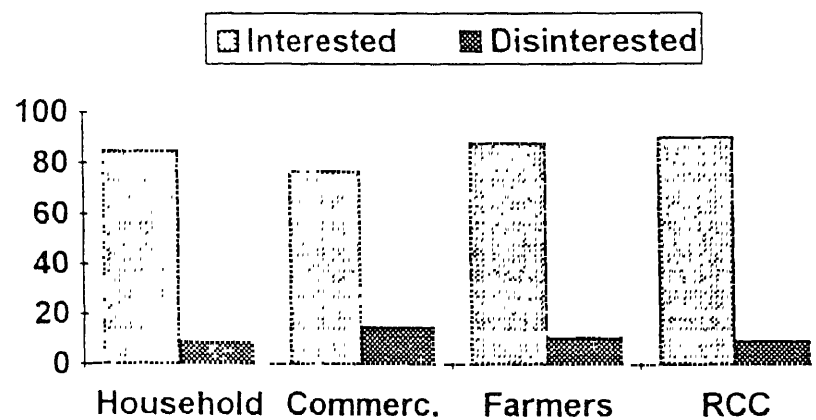
Table 6.3 : Minimum Power Requirement

All Figs in %

	House- holds N = 222	Comm. Estab. 117	Far- mers 110	Rural Comm. Centres 10
No. Of lights				
One	26	16	12	40
Two	40	25	38	30
Three	16	09	26	--
Four	10	09	09	--
More than Four	09	29	15	--
No. of Fans				
One	37	36	37	70
Two	43	29	30	20
Three	10	16	09	--
More than Three	07	29	11	--
TV	27	--	17	10
Refrigerator	04	--	--	--
Electronic Typewriter	--	01	--	--
Computer	--	04	--	--
Water Pump	--	--	05	--
Others	--	19	--	--

- 6.10 The respondents were introduced to the concept of the PVSS and reactions sought subsequently. In urban areas respondents were probed on their interest in PVSS as a back-up source of power and in rural areas respondents were probed on the concept as a supplementary source of power. The responses are summarised below.

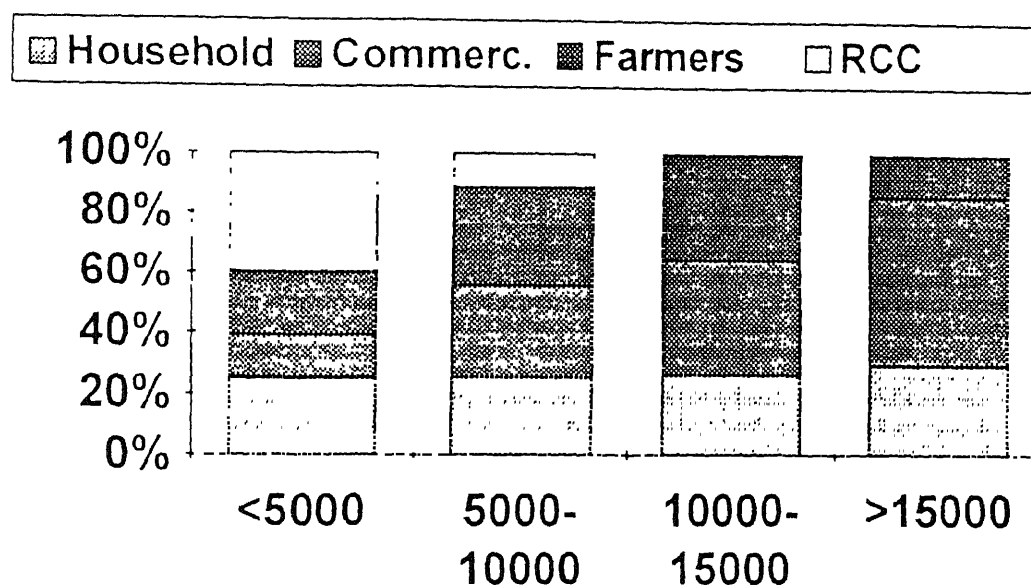
Figure 6.3 : Interest in the Concept



- 6.11 Respondents across segments said they would be interested in the concept. The responses to PVSS was extremely positive at this stage where the cost was not disclosed.

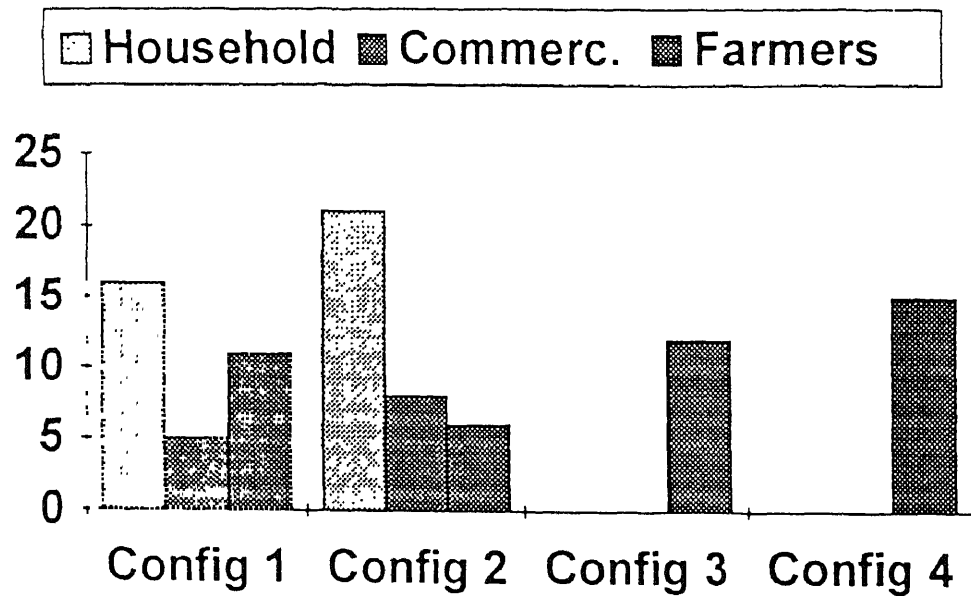
- 6.12 The respondents were probed on their willingness to invest in the product given that it generated sufficient power for their needs. The responses are as summarised in the figure below.

Figure 6.4 : Willingness to Invest



- 6.13 Most of the respondents met were not willing to invest more than Rs.10,000/- in the product. Only in commercial establishments met in the urban centres consumers were willing to invest more than Rs.10000/-

Figure 6.5 : Positive Purchase Intent



Note : For RCC Since the sample size was small it was not calculated separately statewise.

Potential

- 6.14 The rural and urban respondents were exposed to various configurations of PVSS and the respective prices. Based on their responses MBA estimated the potential in the Households and Rural segments.

The configurations that the segments were exposed to is summarised below

Table 6.4 : Configurations

	SEGMENT	CONFIG 1/	CONFIG 2/	CONFIG 3/	CONFIG 4/
		PRICE	PRICE	PRICE	PRICE
(U)	House-holds	1 Lamp, 1 Fan, 1 CTV Rs.28K	2 Lamps, 1 Fan Rs.18K	-----	-----
	Comm. Est	6 Lamps, 2 Fans, 1 TV Rs.54K	6 Lamps, 2 Fans Rs.44K	-----	-----
(R)	Farmers	Irrigation Pump set Rs.280K	Submers. Pump set Rs.88K	2 Lamps Rs.14K	Solar Lantern Rs. 5K
	Rural Comm. Centre	Submers. Pump set Rs.88K	2 Lamps, 1 TV Rs.32K	Solar Lantern Rs.5K	-----

- 6.15 The potential (nos) for Rajasthan estimated by MBA is summarised in Table 6.9 below.

Table 6.5 : Potential

Figs. In Nos.

	URBAN Household	Comm.Est	RURAL Farmers
Config 1	30000	*	13200
Config 2	41000	*	7800
Config 3	----	*	15600
Config 4	----	*	23000

- * Due to non availability of data on the universe of commercial establishments the potential has not been computed.

Uttar Pradesh

- 6.16 The comparison of different segments on their overall satisfaction with the quality of electric supply is summarised in the figure below

Figure 6.6 : Satisfaction with Power Supply



- 6.17 There was marginal difference in the satisfaction levels between Rural & Urban UP. The dissatisfaction levels were high across all the segments.

- 6.18 The respondents were probed on the adequacy of power supply. The findings for UP are summarised in table 6.2 below.

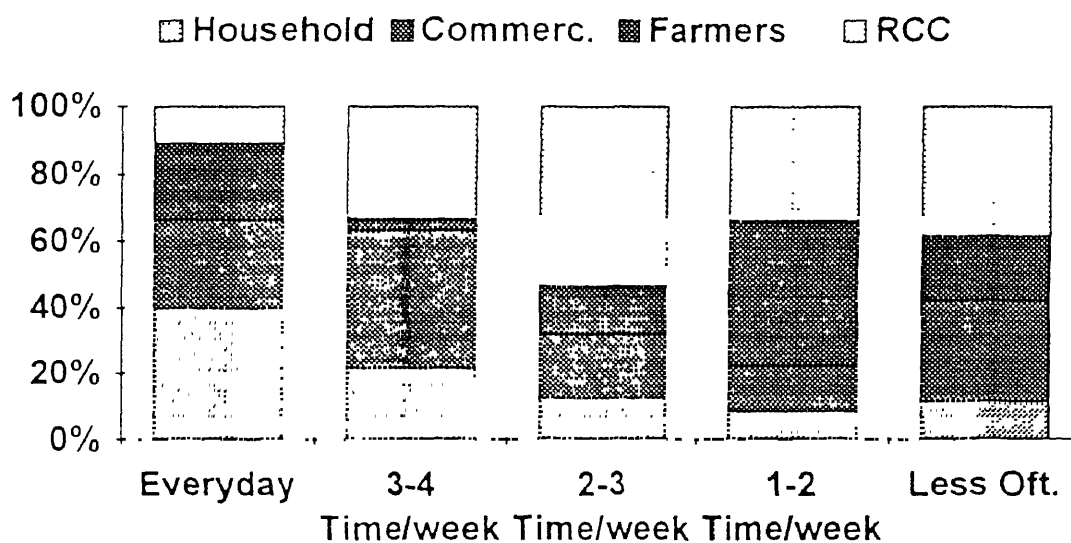
Table 6.6 : Adequate Power Supply

	All Figs in %			
	House- holds N = 210	Comm. Estab. 101	Far- mers 156	Rural Comm. Centres 10
Strongly Disagree	22	16	22	20
Disagree	42	31	42	20
Neither	04	12	04	20
Agree	32	37	32	40
Strongly Agree	--	05	--	--

- 6.19 There was marginal differences between the responses in Rural & Urban UP. Majority of the respondents met disagreed with the statement that there was adequate power supply.

6.20 The respondents were probed on the frequency of power interruptions load shedding. The responses are summarised in the table below.

Figure 6.7 : Frequency of Power Failure



6.21 The frequency of power failure was the highest in the urban households segment in UP where three fourths faced power interruptions everyday. Surprisingly the situation in rural UP seemed better.

- 6.22 Respondents were asked what alternative sources of lighting power they used during interruptions. This is summarised in the table below.

Table 6.7 : Alternative Power Sources

	All Figs in %			
	House- holds N = 210	Comm. Estab. 101	Far- mers 156	Rural Comm. Centres 10
Candles	90	41	97	50
Kerosene Lamps	24	04	90	83
Emergency Lights	31	27	80	--
Invertor	03	04	--	--
Generator	16	68	--	--
UPS	--	03	--	--
Others (Gas Lamps, LPG Petromax, Oil Lamp)	16	01	16	--

(Note : Multiple responses exist)

- 6.23 Candles, kerosene lamps and emergency lamps were the source of alternative lighting mostly used by the respondents. However a substantial number of the commercial establishments met used generators in UP.

- 6.24 The respondents were asked what they felt would be their minimum requirements of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are as below:

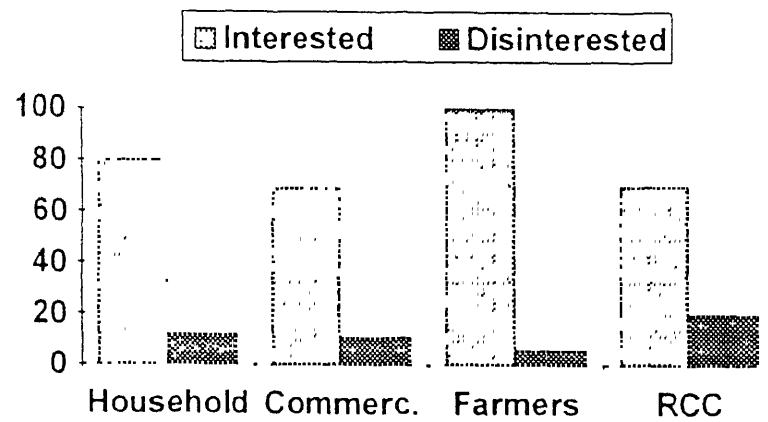
Table 6.8 : Minimum Power Requirement

All Figs in %

	House- holds N = 210	Comm. Estab. 101	Far- mers 156	Rural Comm. Centres 10
No. Of lights				
One	14	05	10	40
Two	51	12	35	20
Three	19	03	15	--
Four	11	08	21	--
More than Four	06	67	16	10
No. of Fans				
One	42	16	34	40
Two	41	30	35	10
Three	09	16	06	10
More than Three	07	--	08	--
TV	43	--	36	20
Refrigerator	03	--	--	--
Electronic Typewriter	--	05	--	--
Computer	--	07	--	--
Water Pump	--	--	18	--
Others	--	04	--	--

6.25 Interest in the concept of PVSS from different segments is summarised below

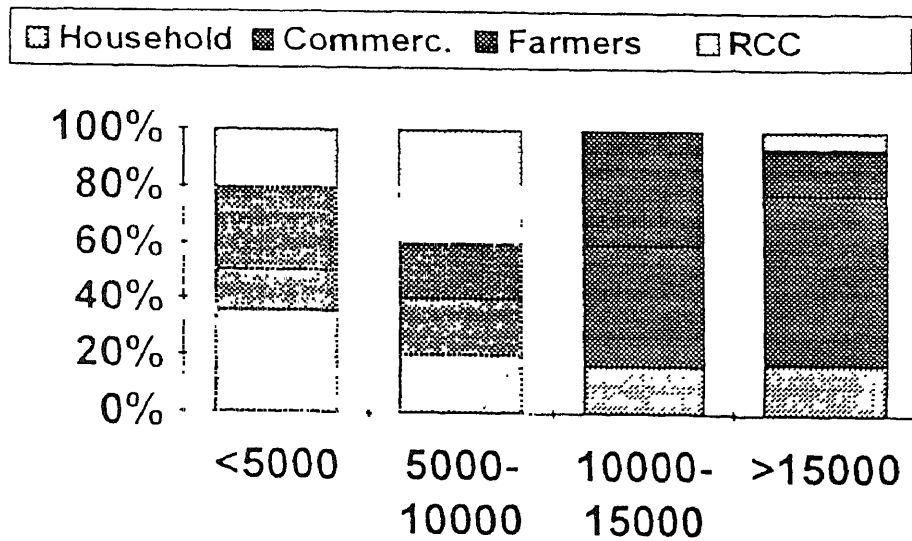
Figure 6.8 : Interest in the Concept



6.26 The concept evoked considered interest among respondents in all segments

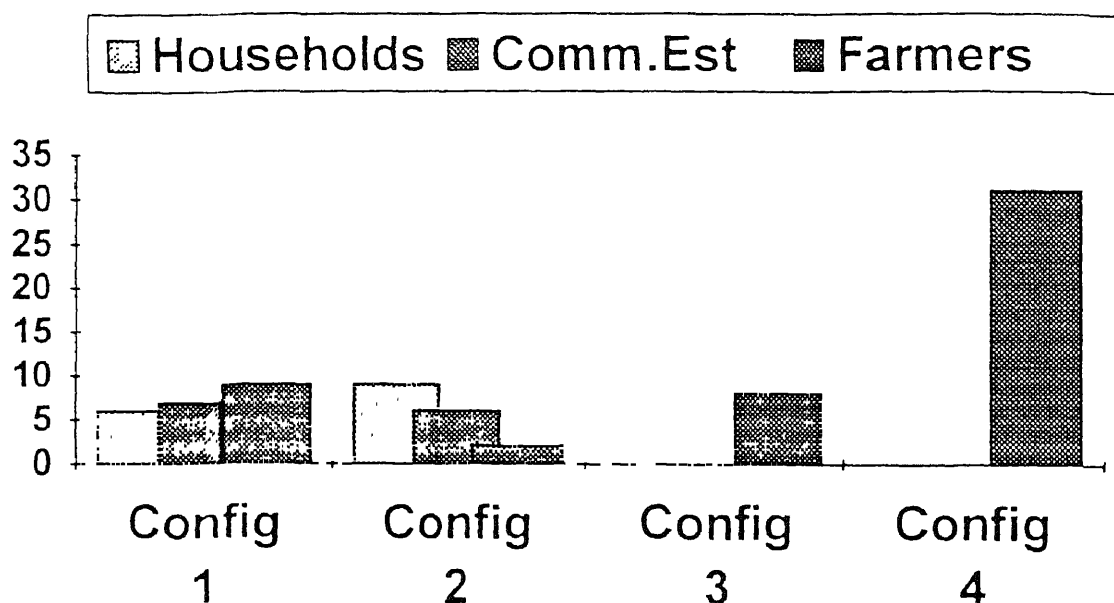
6.27 The respondents were probed on their willingness to invest in the product given that it generated sufficient power for their needs. The responses are as summarised in the figure below.

Figure 6.9 : Willingness to Invest



6.28 Most of the respondents met were not willing to invest more than Rs.10,000/- in the product.

Figure 6.10 : Positive Purchase Intent



Potential

6.29 The rural and urban respondents were exposed to various configurations of PVSS and their respective prices (Refer Table 6.8). Based on their responses MBA estimated the potential in the Households and Rural segments. The potential (nos) for UP estimated by MBA is summarised in Table 6.9.

Table 6.9 : Potential

Figs. In Nos.

	URBAN		RURAL
	Household	Comm.Est	Farmers
Config 1	28000	*	12800
Config 2	50000	*	4400
Config 3	----	*	19800
Config 4	----	*	90300

* Due to non availability of data on the universe of commercial establishments the potential has not been computed.

CHAPTER 7

FINDINGS : STATEWISE : SOUTH INDIA

This chapter presents key tables, consolidated for the Southern states of Andhra Pradesh and Karnataka covered in the survey

Andhra Pradesh

- 7.1 A comparison of different segments on their overall satisfaction with the quality of electric supply is summarised in the figure below

Figure 7.1 : Satisfaction with Power Supply



- 7.2 All the segments had high dissatisfaction levels with the electricity supply in Andhra Pradesh. There was no significant differences in the responses of the rural and urban segments.

- 7.3 The respondents were probed on the adequacy of power supply. The findings for AP are summarised in table below

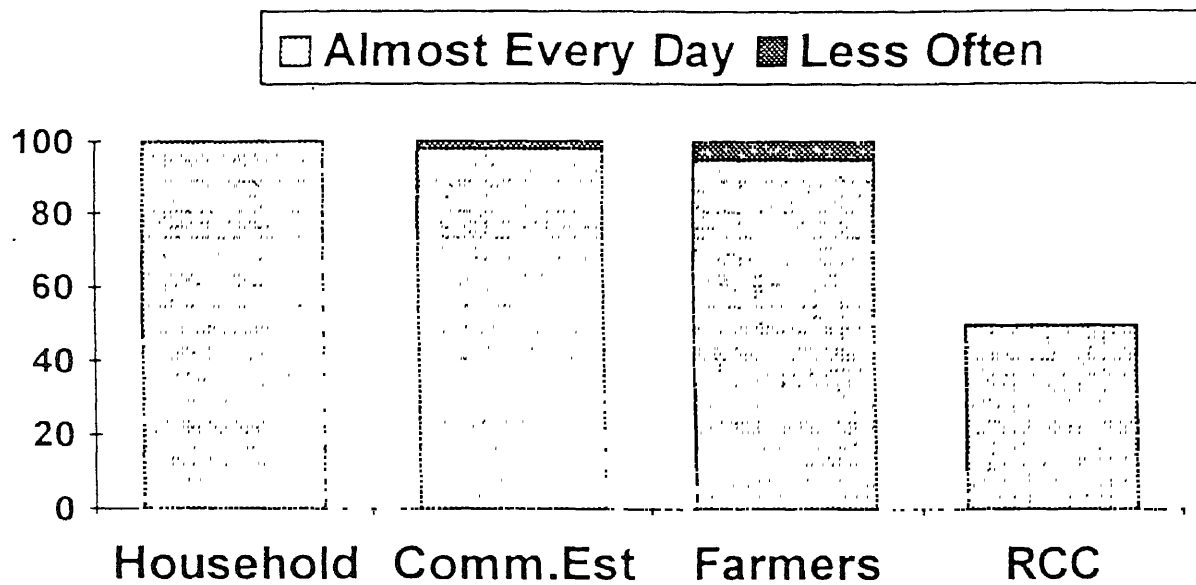
Table 7.1 : Adequate Power Supply

	All Figs in %			
	House- holds N = 208	Comm. Estab. 101	Far- mers 101	Rural Comm. Centres 12
Strongly Disagree	21	30	32	--
Disagree	65	68	38	40
Neither	07	01	16	--
Agree	06	01	11	10
Strongly Agree	01	--	03	--

- 7.4 There were similar responses in rural and urban Andhra Pradesh. Majority of the respondents met disagreed with the statement that there was adequate power supply.

- 7.5 The respondents were probed on the frequency of power interruptions load shedding. The responses are summarised in the table below.

Figure 7.2 : Frequency of Power Failure



- 7.6 The frequency of power failure was high across segments in AP. Nearly 100% of the respondents said that there was power interruptions everyday.

- 7.7 Respondents were asked what alternative sources of lighting power they used during interruptions. This is summarised below.

Table 7.2 : Alternative Power Sources

	All Figs in %			
	House- holds N = 208	Comm. Estab. 101	Far- mers 101	Rural Comm. Centres 12
Candles	65	46	50	--
Kerosene Lamps	42	02	93	100
Emergency Lights	44	27	10	--
Invertor	01	06	--	--
Generator	01	19	--	--
UPS	--	01	--	--
Others (Gas Lamps, LPG Petromax, Oil Lamp)	0912	05	--	--

Note : (Multiple responses exist)

- 7.8 Candles, kerosene lamps and emergency lights (battery powered) were the source of alternative lighting mostly used by the respondents. Use of generators amongst commercial establishments was high.

- 7.9 The respondents were asked what they felt would be their minimum requirement of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are as below

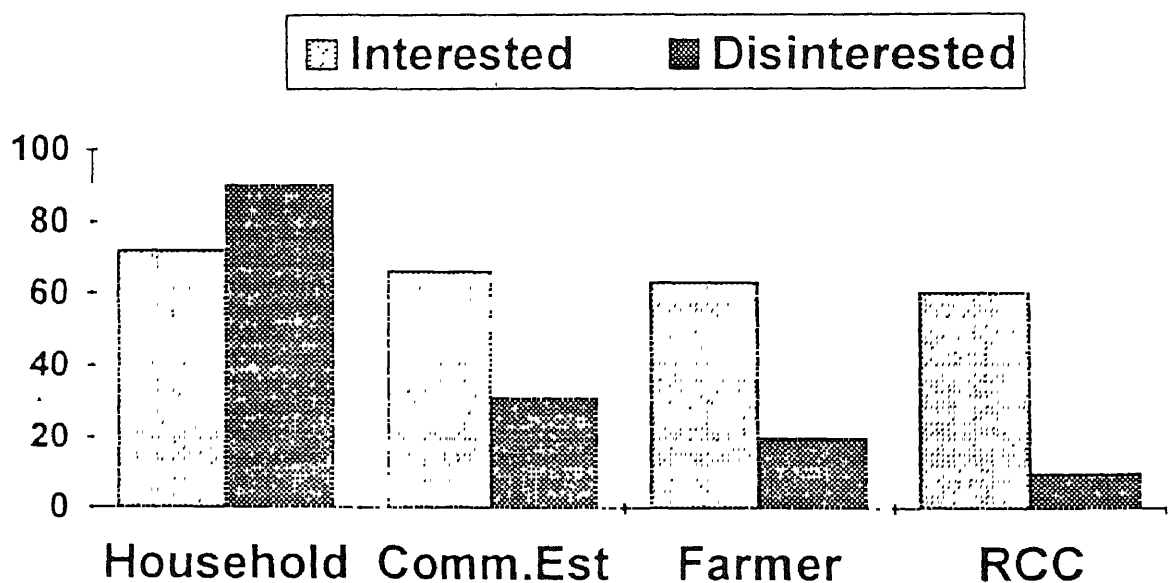
Table 7.3 : Minimum Power Requirements

All Figs in %

	House- holds N = 208	Comm. Estab. 101	Far- mers 101	Rural Comm. Centres 12
No. Of lights				
One	07	01	10	--
Two	48	32	51	50
Three	10	09	12	--
Four	19	26	10	--
More than Four	16	32	13	--
No. of Fans				
One	32	23	59	40
Two	47	49	19	--
Three	06	07	01	--
More than Three	08	17	06	--
TV	71	--	39	--
Cooking Devices	02	--	--	--
Computer	--	13	--	--
Water Pump	--	--	03	--
Others	--	12	--	--

- 7.10 The respondents were introduced to the concept of the PVSS and reactions sought subsequently. In urban areas respondents were probed on their interest in PVSS as a back-up source of power and in rural areas respondents were probed on the concept as a supplementary source of power. The responses are summarised below.

Figure 7.3 : Interest in the Concept



- 7.11 Respondents across segments said they would be interested in the concept. The responses to PVSS was extremely positive at this stage where the cost was not disclosed.

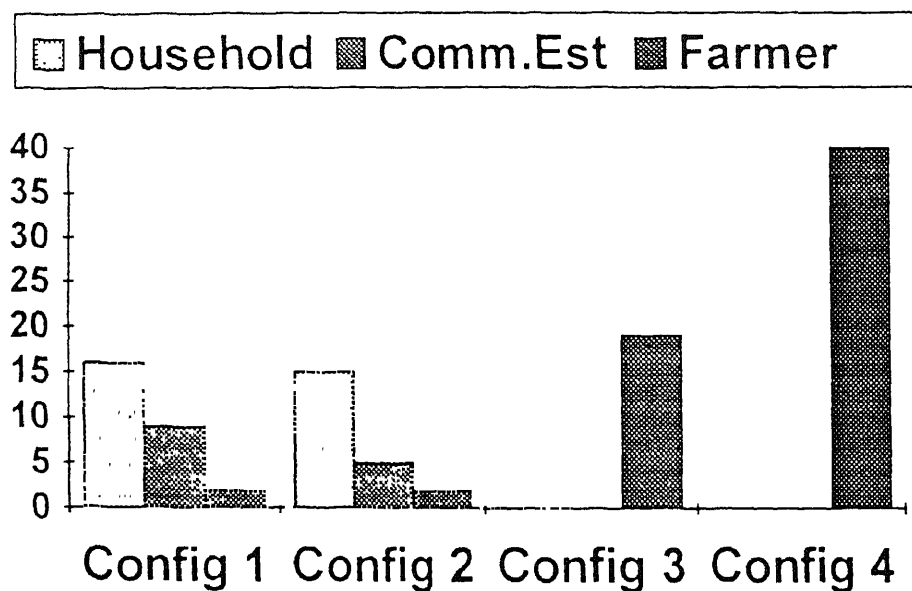
- 7 12 The respondents were probed on their willingness to invest in the product given that it generated sufficient power for their needs. The responses are as summarised in the table below.

Table 7.4 : Willingness to Invest

All Figs in %				
	House- holds N = 208	Comm. Estab. 101	Far- mers 101	Rural Comm. Centres 12
< 5000	30	20	59	100
5000 - 10000	46	27	27	--
10000 - 15000	17	10	06	--
> 15000	06	38	08	--

- 7.13 Most of the respondents met were not willing to invest more than Rs 10000/- in the product. Only in the commercial establishments the consumers were willing to invest more than Rs 15000/- in the product.

Figure 7.4 : Positive Purchase Intent



Potential

- 7 14 The rural and urban respondents were exposed to various configurations of PVSS and the respective prices. Based on their responses MBA estimated the potential in the Households and Rural segments

The configurations that the segments were exposed to is summarised below

Table 7.5 : Configurations

	SEGMENT	CONFIG 1/ PRICE	CONFIG 2/ PRICE	CONFIG 3/ PRICE	CONFIG 4/ PRICE
(U)	House-holds	1 Lamp, 1 Fan, 1 CTV Rs.28K	2 Lamps, 1 Fan Rs.18K	-----	-----
	Comm. Est.	6 Lamps, 2 Fans, 1 TV Rs.54K	6 Lamps, 2 Fans Rs.44K	-----	-----
(R)	Farmers	Irrigation Pump set Rs.280K	Submers. Pump set Rs.88K	2 Lamps Rs.14K	Solar Lantern Rs. 5K
	Rural Comm Centre	Submers. Pump set Rs.88K	2 Lamps, 1 TV Rs.32K	Solar Lantern Rs.5K	-----

- 7.15 The potential (nos) for Andhra Pradesh estimated by MBA is summarised in Table below

Table 7.6 : Potential

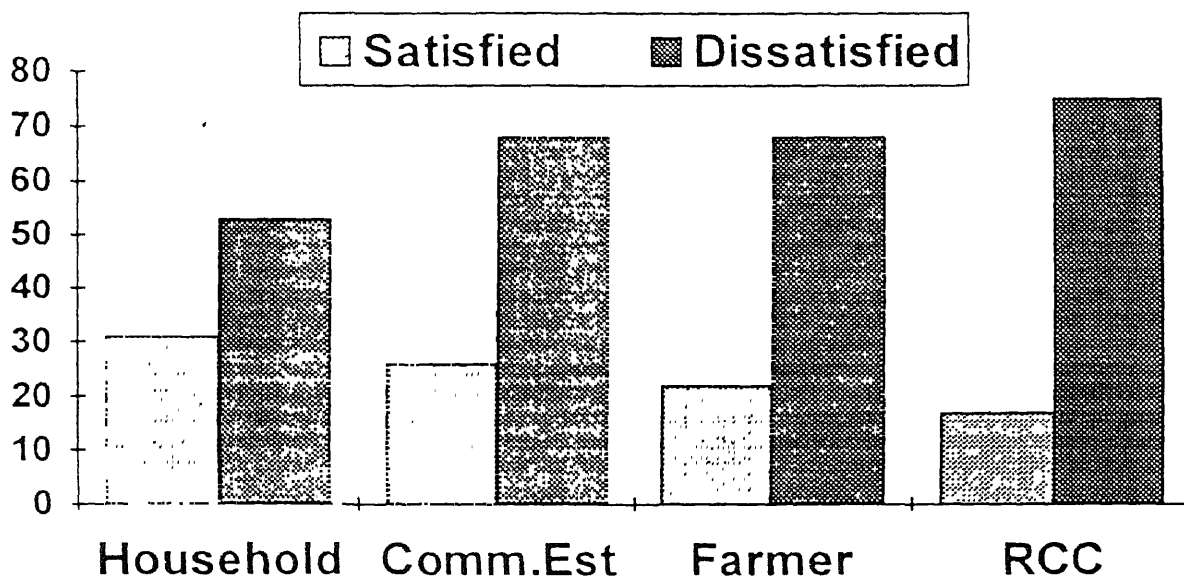
	Figs. In Nos.		
	URBAN		RURAL
	Household	Comm.Est	Farmers
Config 1	55000	*	1200
Config 2	47000	*	900
Config 3	----	*	6900
Config 4	----	*	14900

- * Due to non availability of data on the universe of commercial establishments the potential has not been computed.

Karnataka

- 7.16 The comparison of different segments on their overall satisfaction with the quality of electric supply is summarised in the table below

Figure 7.5 : Satisfaction with Power Supply



- 7.17 Dissatisfaction levels were high across all categories of respondents and there were no significant differences between urban and rural Karnataka.

- 7.18 The respondents were probed on the adequacy of power supply. The findings for UP are summarised in table below.

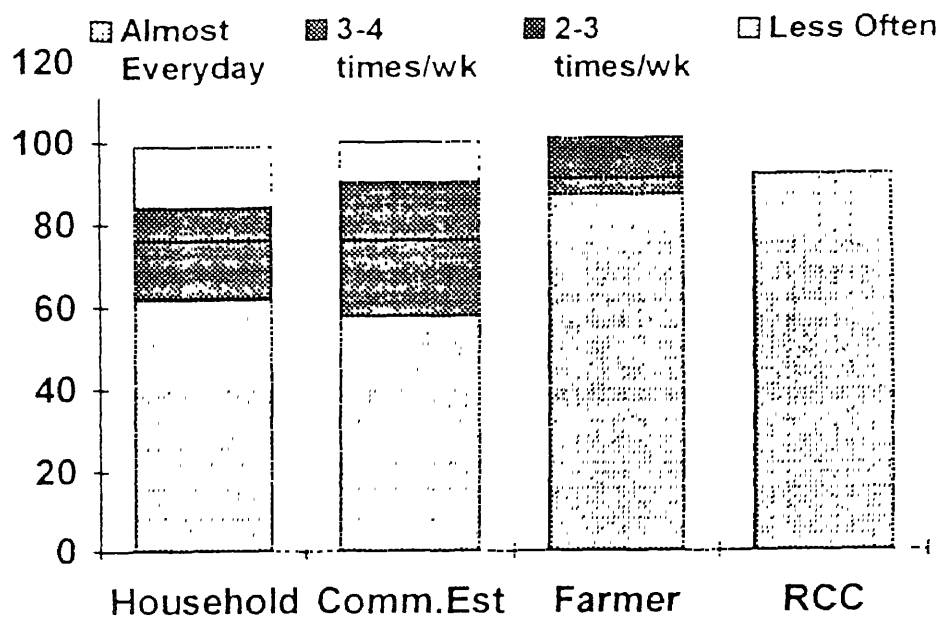
Table 7.7 : Adequate Power Supply

	All Figs in %			
	House- holds N = 253	Comm. Estab. 142	Far- mers 126	Rural Comm. Centres 10
Strongly Disagree	08	16	03	--
Disagree	41	46	55	83
Neither	14	04	12	--
Agree	37	34	30	08
Strongly Agree	--	--	--	--

- 7.19 Most of the respondents disagreed with the statement that there was adequate power supply in Karnataka. The situation in the urban centres was only marginally better than the rural centres.

- 7 20 The respondents were probed on the frequency of power interruptions load shedding. The responses are summarised in the figure below.

Figure 7.6 : Frequency of Power Failure



- 7 21 The frequency of power failure was high in the rural as compared to the urban centres. Most of the respondents in the rural centres complained of power interruptions everyday.

- 7 22 Respondents were asked what alternative sources of lighting power they used during interruptions. This is summarised in the table below.

Table 7.8 : Alternative Power Sources

All Figs in %				
	House- holds N = 253	Comm. Estab. 142	Far- mers 126	Rural Comm. Centres 10
Candles	88	40	48	71
Kerosene Lamps	34	--	82	71
Emergency Lights	30	19	16	--
Invertor	04	09	--	--
Generator	01	33	03	--
UPS	--	02	--	--
Others (Gas Lamps, LPG Petromax, Oil Lamp)	10	07	10	--

Note : (Multiple responses exist)

- 7 23 Candles and kerosene lamps were the most widely used alternative source of lighting across the segments. Amongst the urban centres and farmers the emergency lights also seemed fairly popular. A substantial number of the commercial establishments used generators.

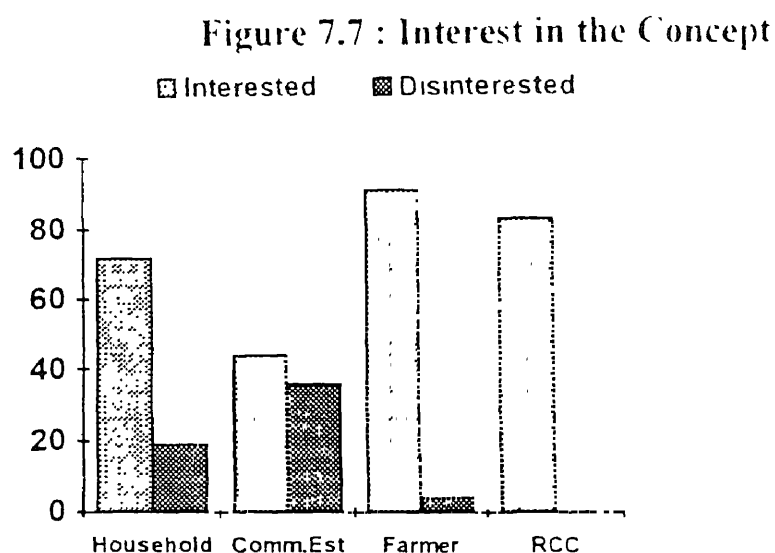
- 24 The respondents were asked what they felt would be their minimum requirements of lighting and cooling (in case of power failure) to enable them to continue with their chores smoothly. The responses are as below:

Table 7.9 : Minimum Power Requirement

All Figs in %

	House- holds N = 253	Comm. Estab. 142	Far- mers 126	Rural Comm. Centres 10
No. Of lights				
One	12	16	02	08
Two	44	28	16	33
Three	18	04	14	17
Four	12	09	17	17
More than Four	11	38	44	41
No. of Fans				
One	52	28	29	42
Two	23	18	18	--
Three	05	04	04	--
More than Three	05	05	13	--
TV	46	--	72	33
Cooking Devices	06	--	--	--
Refrigerator	01	--	--	--
Electronic Typewriter	--	05	--	--
Computer	--	06	--	--
Water Pump	--	--	29	--
Others	--	14	--	--

7.25 Interest in the concept of PVSS from different segments is summarised below



7.26 The concept evoked considerable interest among respondents in all segments.

7.27 The respondents were probed on their willingness to invest in the product given that it generated sufficient power for their needs. The responses are as summarised in the table below :

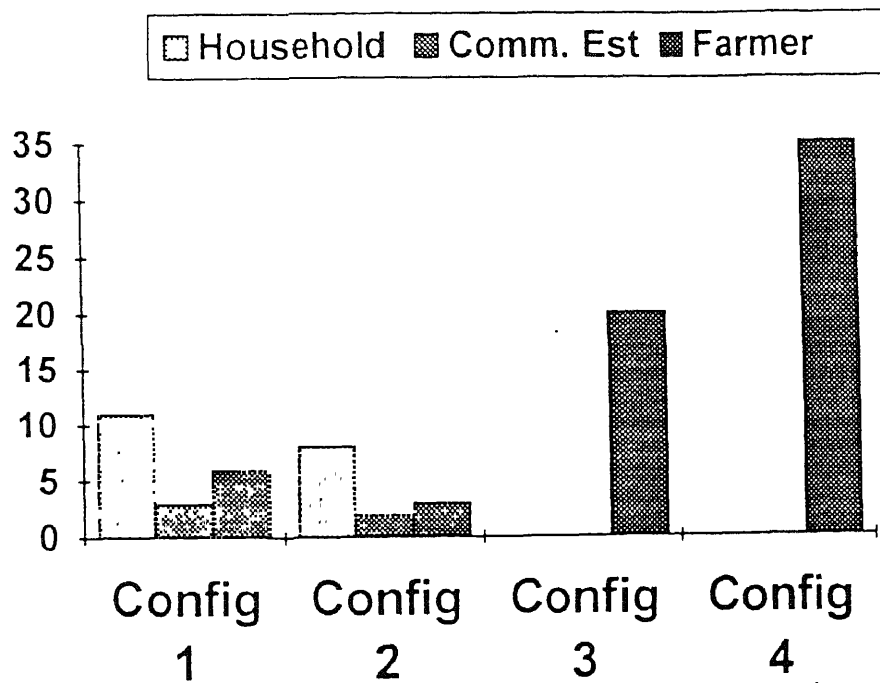
Table 7.10 : Willingness to Invest

All Figs in %

	House- holds N = 253	Comm. Estab. 142	Far- mers 126	Rural Comm. Centres 10
< 5000	43	35	26	25
5000 - 10000	26	20	14	--
10000 - 15000	10	10	10	17
> 15000	08	13	33	--

- 7.28 In the urban centres most of the respondents were not willing to invest more than Rs 10000/- in the product. The enthusiasm amongst farmers seemed high as 33% of the farmers were willing to invest more than Rs 15000/-.

Figure 7.8 : Positive Purchase Intent



Potential

- 7 29 The rural and urban respondents were exposed to various configurations of PVSS and there respective prices (Refere Table 7.8) Based on their responses MBA estimated the potential in the Households and Rural segments The potential (nos) for Karnataka estimated by MBA is summarised in Table below .

Table 7.11 : Potential**Figs. In Nos.**

	URBAN		RURAL
	Household	Comm.Est	Farmers
Config 1	24000	*	3800
Config 2	20000	*	2300
Config 3	----	*	12600
Config 4	----	*	23500

- * Due to non availability of data on the universe of commercial establishments the potential has not been computed.

Chapter 8

Summary and Recommendation

This chapter summarises the findings of the study by segments as well as statewise.

Households

- 8 1 Across the states overall there was dissatisfaction with the quality of power supply. Most of the respondents felt that there was inadequate power supply and the frequency of power failures was high too. The situation was exceptionally bad in Andhra Pradesh. Most of the households still used primitive lighting devices like candles and kerosene lamps for alternative lighting during power interruptions. A low percentage household were using emergency lights and an even lower percentage of households were using generators/invertors.
- 8 2 The requirement during power failures was usually 2 lamps, 2 fans and a TV set. The reaction to the concept of PVSS was highly positive, but most respondents were not willing to invest more than Rs. 5,000/- to 6,000/-. The purchase intent after exposure to price was low for all configurations of PVSS.

Commercial Establishments

- 8 3 As in the households segment dissatisfaction level with overall power situation was high. The situation was somewhat better in Rajasthan. Most respondents complained of inadequate power supply and high frequency of power failure across centres.

- 8.4 For alternative lighting primitive devices like candles and kerosene lamps were being used though a fair number of respondents used generators too in the urban centres
- 8.5 The minimum requirement during power failures was 2 fans and 2 lights among the establishments met. The reaction to the concept was positive but most respondents were not willing to invest more than Rs 10,000/- in the product.

Farmers

- 8.6 The power situation in the rural areas was worse. The average number of hours that the farmers got power supply in a day was around 10. Overall the situation in the South was better than in the North especially Rajasthan where dissatisfaction levels were very high. The sources of alternative lighting used during power interruptions were lamps and candles. The requirements of power were for 2 lamps, 2 fans, 1 TV and water pumping system.
- 8.7 The reaction to the concept was positive but here too farmers were not willing to invest more than Rs. 10,000/- except in Karnataka where a third of the farmers said they were willing to invest Rs. 15,000/- or more. Overall, the purchase intent was low at the indicated prices.

Rural Community Centres

- 8.8 The situation in the rural community centres was no better. There too the dissatisfaction levels with power supply was high and the supply was inadequate. At times of power supply interruptions candles and kerosene lamps were being used for lighting. The minimum requirement of power at the community centres is 2 lamps, 2 fans and 1 TV. Investment in a secondary source of power such as the PVSS was not a high priority areas as is evident from the purchase intention at the community centres.

Suggestions

- 8 9 Based on the above findings its clear that there is a power crisis across the country and alternative source of power would be welcome. However MBA feels the price of the product acts as a major deterrent as also awareness of Non Conventional Energy Sources. There is a need to educate the masses as well as develop a more cost effective system.
- 8 10 The high initial investment for the PVSS comes as a surprise for most consumers, leading to negative purchase disposition. What is not being considered by these same consumers, is the low recurring expenditure on the PVSS. The marketing plan must highlight future savings as a key benefit.